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THE UNIVERSITY OF ALBERTA
A FOLLOW-UP STUDY OF VOCATIONAL HIGH SCHOOL
STUDENTS ON APPRENTICESHIP PROGRAMS

(C)

by
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A THESIS
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ABSTRACT

One purpose of the study was to determine criteria governing the placement of former vocational high school students on apprenticeship programs. Another purpose was to compare achievement levels of vocational students with achievement levels of apprentices without vocational training prior to commencement of apprenticeship.

Data for the study were obtained from the Alberta Apprenticeship Board in regard to all graduating motor mechanic apprentices over a one year period.

The findings indicated that granting of credits for one or two technical periods depended upon students obtaining pass marks on placement tests corresponding to the final examinations for the first and second technical periods.

Reductions in time to be served to complete apprenticeship were closely related to attainment of pass marks on the first placement test. Maximum reductions were also granted students with the stipulated number of high school and vocational credits.

Inconsistencies in the application of the placement policy were noted. Students who attained

pass marks on the first placement test did not necessarily progress to write the second placement test.

Criteria governing placement of students with fewer than the stipulated high school and vocational credits could not be identified.

The vocational students had a mean on the first placement test lower than the pass mark reflecting a high failure rate. High school credits and vocational credits were poor predictors for success on the placement tests as well as poor predictors for success on apprenticeship programs.

The placement tests were found to be good predictors for success on apprenticeship programs.

It was recommended that further research be carried out to determine reasons for vocational students having difficulties in obtaining pass marks on the placement tests and generally having low achievement levels on apprenticeship programs.

Another recommendation was that an examination be carried out to discover if denial of advanced standings is deterring prospective apprentices from entering apprenticeship. A final recommendation was that the coordination of the two programs be investigated in detail.

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Chapter 1

PURPOSE AND SIGNIFICANCE OF THE STUDY

Introduction

The post World War II era was characterized by an increased emphasis on providing more and better education for the citizens of most nations. For the underdeveloped countries priority was placed upon eradication of illiteracy. In the developed nations emphasis was placed on improving academic standards and technical and vocational education according to a nation's needs based upon industrial development.

Canada entered a transitional period. Although the agricultural sector of the nation's economy maintained its great importance there was a tremendous development in the industrial and business sectors. The need for manpower possessing technical and trade skills increased at the rate of developments in industry. The same era was also characterized in Canada by the thousands of immigrants arriving yearly. These people brought with them technical and trade skills in great demand by industry. The supply and demand for technicians was nearly equal and the need for technical education facilities was realized by few people.

Late in the 1950's the flow of skilled

immigrants slowed down. The industrial development continued however, and it was evident that technical training facilities had to be provided to not only supply the needed manpower, but also to provide an opportunity for the young people leaving school to acquire training that would provide them with saleable skills for the labour market.

Federal funds were made available through the Technical Vocational Training Act to the provinces (Bryce, 1970:4) for the building and equipping of technical and vocational centres as well as for operating expenditures on a cost shared basis.

Alberta was in particular able to enter into cost-sharing agreements with the Federal Government due to its favourable economic position. The Alberta Institute of Technology and Art in Calgary was expanded and renamed the Southern Alberta Institute of Technology. The Northern Alberta Institute of Technology was built in Edmonton to serve that part of the Province. Smaller training centres were built in areas with a less dense population, or existing facilities were expanded to serve special and local needs.

Simultaneously, cost sharing agreements were reached between the two levels of government to permit the Province to expand and upgrade its vocational education program within the high school structure.

The vocational education high school program permitted the student to receive the early phases of vocational and technical training programs, while still continuing his academic education. The program provided not only training for future technicians and other vocational occupations, but trades training was also provided.

To create maximum efficiency and effectiveness between the vocational high school program and the technical institutes, steps were taken by the Department of Education to ensure that the vocational education student could articulate with the technical institutes. The technical institutes are operated as branches of the Department of Education. Thus possible problems in articulation may be solved as a departmental affair.

Trades training in Alberta is governed by the Department of Labour with the training function carried out by the technical institutes and to a lesser degree by selected community and agricultural colleges. The course outlines are provided by the Department of Labour upon recommendations from local and provincial advisory committees.

While the Technical, Vocational Training Act (TVTA) provided federal funds for vocational high school training and for the training of technicians, the

apprenticeship programs continued to receive federal support under a separate Apprenticeship Training Agreement (Bryce:1970:182).

Possible problems in coordinating the vocational high school programs under the jurisdiction of the Department of Education, and the apprenticeship programs under the jurisdiction of the Department of Labour, thus became inter-departmental problems with a resulting greater complexity.

One specific problem area has been the accreditation of vocational education high school students on trades training programs sponsored by the Department of Labour. It had been reported by apprentices to the instructors at the technical institutes that some apprentices with credits from the vocational education high school program had not been accredited as recommended on articulating with the apprenticeship program and had thus not obtained an advanced standing nor been placed on an accelerated program. Similar statements were also reported by vocational high school teachers. Presentations to the Commission on Educational Planning (Worth:1972) supported the above claims.

New teaching methods and techniques are being developed. New skills and knowledge are required by the technician and tradesman as a result of

technological developments. A constant self-examination of the institutions is a vital necessity. An on-going research program can provide answers to known problems as well as discover problems not realized by the administrators. Good (1972:4) states that three purposes of educational research are to provide answers to operational questions, to assess educational programs, practices and materials, and to build a body of information about educational enterprises.

The follow-up study is a particular type of research described by Best (1959:120) as used to investigate individuals who have left an institution after having completed a program, a treatment, or a course of study. Such study is concerned with what has happened to these individuals, and what has been the impact of the institution and its program upon them.

Background to the Study

The history of vocational education in Alberta evolved around two separate concepts referred to as apprenticeship training under the auspices of the Department of Labour, and vocational education under the auspices of the Department of Education.

Apprenticeship Training. Learning and training through apprenticeship is a concept that has been used since the dawn of civilization. The young candidate for journeyman status worked with, and lived with, the

experienced master craftsman for a period of several years for the specific purpose of learning a trade. The arrangement was informal for centuries. As the trade guilds developed in Western Europe several centuries ago the arrangements became more formal. The guilds would decide upon the length of time the apprentice would have to serve his master in order to be deemed a competent journeyman and hence be able to join the guild himself. Even in contemporary society in Western Europe it is common for employer organizations to control the apprenticeship programs and to conduct the final examinations the apprentice must pass in order to secure his journeyman's qualifications.

Formal organization of apprenticeship training came into effect in Alberta by the Provincial Legislature passing the Apprenticeship Act in 1944 (Young and Machinski:1972:47). The Act specified the length of time to be served by the apprentice as well as conditions such as minimum training requirements. The Act also provided for the licensing of the apprentice having met the stipulated conditions.

A vocation may become designated as a trade upon petition from the people engaged in that particular aspect of an industry. Standards of training and minimum competency are established and

maintained by the Provincial Apprenticeship Board, a branch of the Department of Labour, in cooperation with management and labour through advisory committees.

Apprenticeship in a designated trade begins for a young man or woman when he or she, and the employer, jointly apply to the Apprenticeship Board for approval and registration of the proposed apprenticeship. Work experience will be gained through on-the-job training under the auspices of an experienced journeyman. Once a year the apprentice will attend one of the provincial institutes of technology where courses are being taught to provide the necessary theoretical knowledge, provide training in supporting subjects such as mathematics and science, and to provide experience in the use of machines and instruments not found in all places of employment. The total time to be served varies from trade to trade, but is generally four years. The training courses for the apprentices at the technical institutes are generally of eight week's duration, but may vary from four to twelve weeks according to the trade.

At the conclusion of each training period at the institute, achievement ratings are forwarded to the Apprenticeship Board. A final examination is conducted by the Apprenticeship Board. Promotion to the following year's program is determined by the ratings obtained by

the apprentice on this final examination as well as the institute rating and recommendations from the employers. The apprentice is issued a Certificate of Completion of Apprenticeship and a Certificate of Proficiency in the particular trade at the conclusion of the specified training period and after having attained pass marks for the four year program. The training period is usually four years.

Vocational Education in Alberta High Schools.

Vocational courses have been offered on a limited basis in Alberta high schools for quite some time. The Technical and Vocational Act permitted the Department of Education to enter the field in earnest in 1960. The federal act provided financial assistance to the provinces under specific conditions, one of which was that the students electing vocational courses had to spend at least half the school day in courses that would prepare them for entry into employment by developing occupational skills (Young and Machinski).

The students were now able to obtain a high school diploma even if not scholastically inclined, and at the same time earn credits permitting them to continue their education at a technical institute, prepare themselves for entering the apprenticeship program or enter the labour market directly.

From a modest start in 1945 apprenticeship

training in Alberta had by 1957 developed to provide training in fifteen designated trades for 3,657 trainees (Department of Labour, Canada, 1957:31). By 1968 the apprenticeship program had expanded to provide training for 7,946 apprentices. Simultaneously the vocational high school program had in the school year 1968 - 69 a total of 19,648 students enrolled in various vocational courses (Young and Machinski, 1972:94).

Coordination of Training Programs. To ensure maximum efficiency and effectiveness in the vocational education programs a plan for articulation of vocational high school students with apprenticeship programs was arranged between the Department of Labour and the Department of Education.

Curricula were developed in such a manner that the vocational courses offered in the high schools were somewhat similar to those offered apprentices during their early training at the institutes of technology. Harder (1972:17) states the conditions for articulation as being:

- (a) A person who presents to Apprenticeship authorities of the Department of Labour one hundred high school credits, including at least 35 credits in one of the above high school programs (excepting beauty culture), and an acceptable application for apprenticeship in the corresponding apprenticeship

program, may be granted apprenticeship credits on the following basis:

- (1) For Building Construction, Auto Body, Automotives, Electricity, Pipe Trades, Sheet Metal, Machine Shop, Electronics, Appliance Serviceman and Agricultural Mechanics - one year of time credits (3 month shortening of each of the four 12 month periods) and First and Second Period Technical credit upon passing the examinations for these periods.
- (b) A person who presents fewer than 100 High School credits with a minimum of 35 credits in one of the above Vocational programs, or a person who presents 100 High School credits with fewer than 35 credits in one of the above vocational programs, may expect to be considered for lesser apprenticeship credit on the basis of individual performance upon undertaking apprenticeship.

The articulation process is illustrated in Figure 1.

Statement of the Problem

The general problem investigated in this thesis has to do with the determination of placement criteria for vocational high school students advancing to apprenticeship programs and comparisons of achievement levels of these apprentices with the achievement levels of apprentices without vocational training prior to commencement of apprenticeship. The general problem may be stated as two major problems having certain specific subproblems as follows:

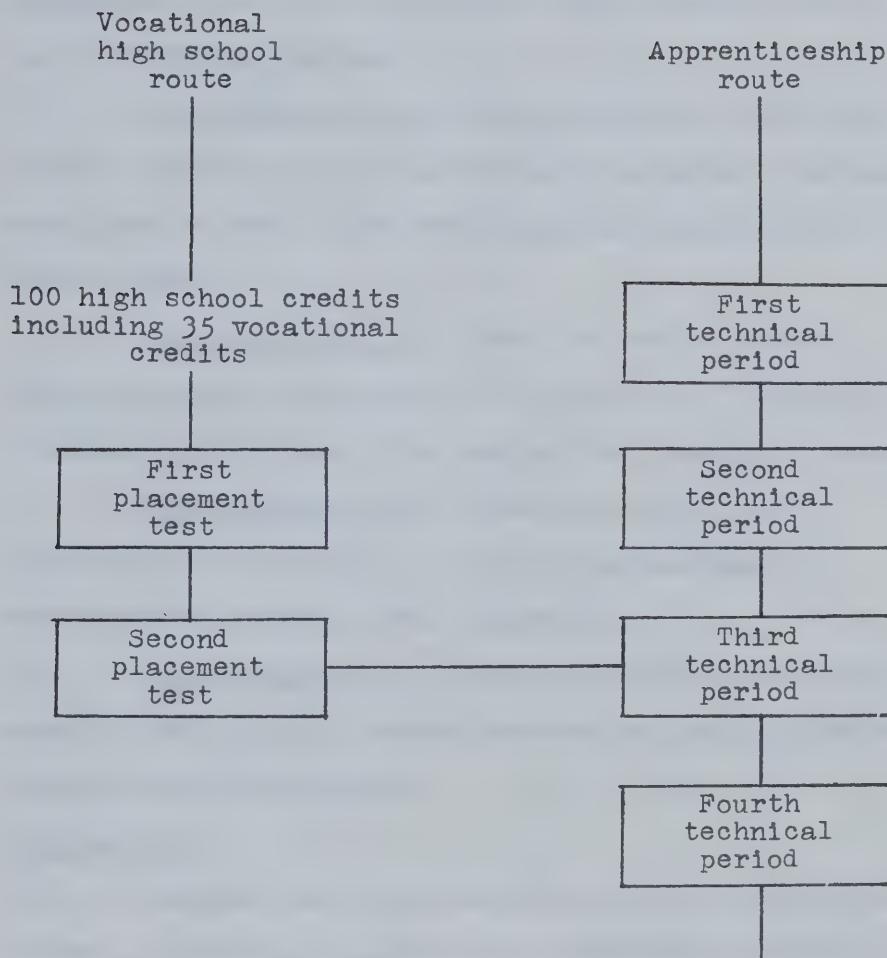


Figure 1

Articulation of Vocational High School Students with Apprenticeship Program

Problem No. 1

What criteria govern the placement of former vocational high school students articulating with the apprenticeship program?

Subproblem No. 1.1 What effect(s) have high school credits upon the granting of advanced standings with credits for one or two technical periods to apprentices?

Subproblem No. 1.2 What effect(s) have placement test results upon the granting of advanced standings with credits for one or two technical periods?

Subproblem No. 1.3 What effect(s) have placement test results on placing apprentices on accelerated apprenticeship programs?

Subproblem No. 1.4 What effect(s) have high school credits upon placing apprentices on accelerated apprenticeship programs?

Problem No. 2

Whereas the first question has to do with the criteria governing placement of vocational students on apprenticeship programs, the second problem deals with the achievement levels of these students as compared with apprentices without prior vocational training.

Subproblem No. 2.1 How do achievement levels of former vocational high school students on apprenticeship programs compare with achievement levels

of apprentices without vocational training prior to apprenticeship based upon high school and vocational credits?

Subproblem No. 2.2 How do achievement levels of former vocational high school students on apprenticeship programs compare with achievement levels of apprentices without vocational training prior to apprenticeship based upon actual placement on the programs?

Significance of the Study

Although much research has been carried out in the fields of primary and secondary education, considerable less attention has been paid to the problems on the post-secondary, non-university levels. Studies have been done on problems related to the community college, its staff and its students. Likewise the institutes of technology have been the concern of the researcher in regard to problems associated with the technology programs.

A lack of attention has been paid to the problems associated with apprenticeship training. Broad (1972:9) states that insufficient studies have been carried out in North America, despite the fact that apprenticeship as an educational method is both widespread and common. Saunders (1972:30) thus reported that the Northern Alberta Institute of

Technology in 1971 provided training for 5,018 apprentices as compared with 3,490 students in other technical areas.

The need for studies of problems associated with former vocational education students articulating with apprenticeship programs was indicated by the Commission on Educational Planning. Worth (1972:140) expressed the problem as

Another specific problem exists with respect to accreditation of vocational education courses by the institutes of technology and the Apprenticeship and Tradesmen's Qualifications Board.

Agreements with the Apprenticeship Board have never been very satisfactory, apparently due to a reluctance on the part of the Board to accept the vocational school programs for more than nominal credit.

The study should be significant to not only the administrators of the apprenticeship program, the Apprenticeship Board, but also to the administrators of the vocational education programs in the high school systems and the administrators of the technical institutes.

Since the study dealt with the problem in but one specific trade, it is suggested that the project be considered a pilot study. With modifications the methodology can be applied to other trade areas to obtain information about the overall accreditation problem.

Delimitations

The study was restricted to all apprentices completing their training programs in Alberta in the designated trade of motor mechanics over a one year period from November 1, 1971 to October 31, 1972.

As the study was not a follow-up in the sense of individuals and individuals' perceptions, data in this regard were not considered. Hence data relating to matters such as age and other factors relative to maturation were not included in the study.

Limitations

The study was limited by the following factors.

1. The data for the study were obtained from the office of the Alberta Apprenticeship Board. While all apprentice files referring to the population studied were searched for high school data and other information, the accuracy of the study depends on the reporting of such information and the recording of said information by the Apprenticeship Board.

2. The population selected for the study constituted apprentices having completed the fourth and final section of the training program. The findings thus reflect only upon those apprentices who completed apprenticeship, and not those who decided against entering apprenticeship, and those who left the program prematurely.

3. The information obtained covered a time span of four years. The data in regard to articulation covered the first two years of the four year span. Any conclusions and implications based upon the study thus pertain to that particular moment in time only, and do not necessarily reflect the past nor the present.

Definition of Terms

The following definitions are intended to clarify some of the terms used in the study. For the purpose of this study no distinction was made between the terms of teacher and instructor, and the terms education and training.

Advanced Standing. The term refers to the granting of credit for one or two technical periods without attending the formal apprenticeship courses at the technical institutes or community colleges.

Accelerated Program. A program permitting an apprentice to complete his training on-the-job in a shorter than normal time period.

Apprentice. The term refers to a person having signed a legal contract with an employer and the Alberta Apprenticeship Board for the purpose of learning a trade.

Apprenticeship Act. An act passed by the Alberta Legislature in 1944 governing apprenticeship training.

Apprenticeship Board. A five member board governing the apprenticeship training programs on behalf of the Minister of Labour.

Certificate of Proficiency. A certificate issued an apprentice having served the required time and passed the required examinations. It entitles the holder to practice in the specified trade. It is often referred to as a journeyman's certificate.

Designated Trade. A trade having been proclaimed as such by the Apprenticeship Board and for which formal training programs are provided.

Technical Period. A term used by the Apprenticeship Board referring to the four to eight week duration formal training courses offered by the technical institutes on behalf of the Apprenticeship Board.

Time Credit. The term refers to the reduction in time to be served by apprentices on an accelerated program.

Placement Test. Identical to the examinations conducted by the Apprenticeship Board for apprentices having completed the first and second technical periods, but administered to apprentices seeking advanced standings.

Vocational Education Student. The term refers to students having left high school with credits in

academic and vocational programs regardless of the number of credits.

Work Experience. Refers to that part of the apprenticeship program where the apprentice is learning under the guidance of a licensed journeyman in the place of employment.

Organization of the Thesis

The introductory chapter states the basic problems and the specific subproblems.

The research of relevant literature in regard to follow-up studies, vocational education, apprenticeship training and articulation is presented in Chapter 2.

Chapter 3 describes the procedure followed in gathering of the data and the design of the research project.

An analysis of the vocational students articulating with the apprenticeship program is described in Chapter 4.

Chapter 5 describes the achievement levels of the vocational education students as compared with the achievement levels of apprentices without such formal training throughout the four year program. This part of the study was based upon the amount of previous training without consideration of the actual placement on the apprenticeship program.

Chapter 6 contains an analysis of the achievement levels of apprentices through the four year program based upon the outcome of the placement tests conducted by the Apprenticeship Board for placement purposes.

Chapter 7 contains a summary of the study with conclusions, implications and recommendations resulting from the project.

Chapter 2

REVIEW OF RELATED LITERATURE

Nearly all aspects of education are being critically evaluated. Students are questioning the relevancy of the curriculum. The university student is challenging the autocratic structure guiding his academic studies, and the taxpayer is demanding a greater degree of accountability of the educator. Chapman (1973:69) thus comments

It is therefore in this context and with this realization that the Alberta Chamber of Commerce has made substantial adjustments in its official policy toward education - in keeping, we believe, with the trend of the times. At the present time the government of Alberta is short \$200 million in its 1972-73 overall budget and knowing all of the other priorities which must be considered any government today must be looking toward more efficiency and economy instead of excessive expansion.

An apparent need for change is expressed through the media and through conversations with students, parents and teachers alike.

Suggestions for change are readily provided by laymen, politicians, students and educators. A common characteristic to many of the suggestions is that they are based upon personal beliefs, hunches and philosophical thoughts. There is still a major

function to be fulfilled by the philosopher in regard to education. An increased emphasis must, however, be placed upon the findings of research to guide the politician and educator in making wise decisions in educational matters.

Suggestions for change must necessarily result in decision-making, but decision-making must be based upon theory, and theory must be based upon valid and acceptable research. Mort and Ross (1957:4) illustrate the point when they state that

Action divorced from theory is the random scurrying of a rat in a new maze. Good theory is the power to find the way to the goal with a minimum of lost motion and electric shock.

While research in the physical sciences has enjoyed the goodwill of the public at large due to its readily observable and applicable findings, the situation in the social sciences is somewhat different. The criticism is voiced by Ingram (1972:207) when he says

A major criticism of the uncoordinated, fragmented, overlapping approach to educational research is that it has a minimal impact on policy and practice.

Purpose of Research

The most fundamental purpose of research is to discover new knowledge. A simple definition is provided by Drever (1965:248) when he states that

research is a systematic investigation in pursuit of knowledge, or confirmation, in any field. A more pertinent explanation is suggested by Lucio and McNeil (1969:259) who state that the purpose of educational research

is to provide objective evidence to improve school learning; to convert myth; to change beliefs and attitudes; and to help place the work of the school on firmer ground with the consumer of education.

When relevant research is absent, continue Lucio and McNeil, forces which are questionable may take over the decision-making function. Barnes (1964:4) mentions the need for educators making decisions based upon research when he says

Principals and teachers cannot avoid decisions on instructional problems. Neither can they rationalize gaps in their knowledge by becoming members of the not-so-exclusive club of "no significant differences".

Types of Research

Research can be classified according to two distinct types. Basic research, which is also referred to as fundamental or pure research, is described by Borg (1963:17) as being aimed at the discovery of basic truth and principles. It is usually oriented toward the testing and development of theory without being concerned for the immediate application in field situations. Good (1972:276) explains that fundamental

research is characterized, among other things, by the formulation of new generalizations, explanatory principles, and scientific theories or laws that go beyond the populations and situations represented, with the expectation that some other person will bring improvement in practice.

The second type of research is referred to as applied or field research. The prime concern is with the establishment of relationships and testing of theories in the field setting. Although there is a trend among educational researchers toward a greater involvement in the development and testing of theories in applied research, as is claimed by Borg (1963:19), many field studies are still conducted in education in which little or no attention is paid to theoretical considerations for field applications. Often an attempt is made to find a desirable choice among two alternatives rather than finding an answer to the question of why a certain relationship between variables exists.

In spite of Borg's and others preference for pure research, a third type of inquiry is expanding from the applied type under the name of action research. Good (1972:276) states that action research is characterized by it

Usually stemming from an urgent practical or felt need, with a goal of application of results and improvement

of practice in the particular setting where the group or investigator works, through processes of group planning, execution, and evaluation.

The interest is in the particular problem with less concern as to application to the theoretical population represented by the sample being studied. The value of action research is pointed out by Good (1972:278), when he states that this type of research has resulted in prejudices being challenged, leadership developed, interest in research engendered and curriculum change facilitated.

Problems in Educational Research

The value and necessity of research has been established in the physical sciences for centuries. The value of research in education was generally accepted by the teaching profession and the public some thirty to forty years ago. Unfortunately, educational research has suffered a setback since. Borg (1963:5) mentions a possible reason being a tendency in the past of practising educators to uncritically accept new concepts without examining the supporting evidence.

Culbertson (1963:4) sees the problem as being the practitioners not having used research as a basis for their operations. The path to school improvement has been directed toward the provision of more of what already exists - more classrooms, more books, more

audio-visual equipment and so on. The survival of research in education, claims Culbertson (1963:4)

cannot be accounted for by its contribution to the field, but rather the acceptance of the truism that every field of human endeavor can improve itself by learning more about itself.

The major problem is neither spelling out what is to be researched, says Culbertson, nor is it communicating the results of the completed research studies to practitioners. The real problem is the construction of a mechanism which integrates research into the total educational process and provides for the improvement of the research potential in education. The problem is even more significant when related to educational matters governed by institutions and organizations not directly governed by the educational profession. An example of such a situation is the relationship existing between the apprenticeship program administered by a branch of the Department of Labour, and the public school systems under the guidance of the Department of Education.

The Study

The present study can be classified as a descriptive research project. Borg (1963:202) states that the major purpose of such research is to tell "what is". Although the major function of descriptive studies in education will probably always be directed

to "what is", many surveys do go further than a description of the existing situation. Surveys dealing with curriculum, for example, continues Borg, can obtain information not only about the strength and weaknesses of the current curriculum but also elicit recommendations for change. Many of the more recent surveys give us both a description of current status and a source of ideas for change and improvement.

The Study as a Follow-up Study

The study may also be classified as a follow up study. Best (1959:120) explains the function of the follow-up study as being an investigation of individuals who have left an institution after having completed a program, a treatment or a course of study. The study is concerned with what has happened to them, and what has been the impact of the institution and its program upon them. By examining their status or seeking their opinions, one may get some idea of the adequacy or inadequacy of the institution's program. Studies of this type enable an institution to evaluate various aspects of its program in light of actual results.

Importance of Research in Vocational Education

The value of educational research in vocational education has in the past been underestimated. Brandon and Evans (1965:265) state that while

every vocational teacher, head of a vocational department, or principal of a vocational school is concerned with the effectiveness of his program, the research techniques for determining such effectiveness have been almost entirely unused. One of the best techniques of evaluation has been the follow-up study of the graduates to determine the extent to which they were placed and succeeded in the occupations for which they were trained. Unfortunately, data on success in the occupations are rarely available. Harris (1960:1527) states the problem when he writes

In general, vocational educators have tended to evaluate their programs in terms of the success of their graduates in the occupations for which they have prepared. Even this measure has not been used consistently in depth; neither have the findings reflected in program changes. To know how well the product of the trade and industrial program has fared in the occupational field would require careful follow-up studies conducted over a period of years. No such studies have been reported.

Literature Relating to Vocational Education

Although much research has been carried out in the past in the fields of primary and secondary education, considerable less attention has been paid to the problems on the post-secondary, non-university levels. Studies have been conducted on the junior college and its staff and students. Likewise the technical institutes have been shown the concern of

the researcher. An apparent lack of interest is evident, however, in the field of apprenticeship training.

A study sponsored by the Edmonton Public School Board resulted in Sanders (1970:34) suggesting the development of a plan for a study into the status of the vocational high school program. Among the proposals was the suggestion that a comprehensive study be conducted to measure the benefits to the students in regard to their ability to proceed to employment or to post-secondary education.

Miller (1968) reported on a study conducted by the University of New York into the effectiveness of using a battery of tests in selecting students from high school programs to attend trade courses at the vocational-technical schools in Connecticut. It was found that the original thirty variables on achievement, aptitude, mental abilities and interpersonal values tests could be reduced to only fifteen variables. The modified program could be conducted in much shorter time than the fourteen hours required for the original program with only a minor reduction in predictability.

A follow-up study was conducted by Mack (1969) to determine the success of the 1967 and 1968 pre-employment program sponsored by the Edmonton Public School System. A questionnaire with a 92 percent

return rate indicated that 53 percent of the graduates had secured jobs in fields related to the course.

Several studies have been reported on high school students' vocational plans. Nekolaichuk (1970) used a questionnaire to gather data over a three year period. A majority of the students indicated that they did not believe the teachers and counsellors had contributed to the students' selections. Only thirteen percent of the students who in 1965 indicated they wanted to enter into apprenticeship in the motor mechanic trade followed their initial plans. There was a general consensus among the students that more information is needed for the students to make vocational decisions.

A study was conducted by Campbell (1966) to examine the grade nine marks as predictor criteria for success in selected vocational subjects. One conclusion was that the subjects of reading and science were the best predictors for future success in vocational subjects. A major observation was that many schools were operating in improperly designed buildings, with deficiencies in staff, inadequate equipment and with unrealistic course outlines. It was also found that vocational students often fail or pass courses without any apparent reason.

Furthermore it was found that vocational classes often are characterized by the absence of extremely high and extremely low ability students.

Literature Relating to Apprenticeship Training

In comparison with other fields of education relatively little research has been conducted into the area of apprenticeship. A possible reason for the lack of published and unpublished literature may be the private organization of apprenticeship training common in North America, with the exception of Canada and in particular the Province of Alberta where apprenticeship is controlled by the Province.

Bezeau (1971) examined the relationship between trade practice and training practice in the motor vehicle repair trade in Alberta. A general conclusion was that the automotive curriculum required intensive study to determine the nature of the trade training misalignments, and possible mitigating factors associated with them. Rethinking and possible revising of the automotive curricula was required to ensure its relevance to the demands of the trade.

A federal-provincial study by Muir (1971) examined the impact of specialization upon apprenticeship as a system of training. Recommendations were presented in regard to the curriculum being taught in three trades, including automotives. It was also

suggested that some trades be divided into sub-trades due to the specialization taking place in industry.

Literature Relating to Articulation

In spite of the above mentioned research projects examining one or more aspects of vocational education and apprenticeship training, including follow-up studies on employment, not a single study referred to students articulating with the apprenticeship program.

Leeck (1971) compared vocational success of high school graduates and drop-outs, and found that leaving high school did not necessarily lead to disadvantages. It was found that a majority of the school drop-outs were receiving further education or training and had no regrets about having left school. Presumably some of the students were apprenticesing, but the report did not state so.

In a study of personal qualifications deemed desirable for employability Uttaro (1972) found a high degree of congruence between the opinions of vocational students, their teachers and employers. One recommendation arising from the study was that further studies be done to determine the extent to which employers' expectations are actually met in the hiring of vocational high school graduates. No mention was made in regard to vocational students receiving post

secondary training in the trades.

McDougall (1970) examined the career pattern of students who had graduated from the vocational high schools in Calgary. Twenty four out of thirty six graduates (63%) in automotives in 1968 were listed as continuing their education, apprenticesing or working in a field associated with their high school vocational education. The report did not disclose how many graduates had apprenticed in the motor mechanic trade and how many had obtained casual work in the automotive field. Neither did the report refer to problems in articulation with the apprenticeship program.

Summary

The literature was researched in regard to previous studies of problems in vocational education, apprenticeship training and articulation for vocational students with the apprenticeship programs. Few studies were discovered relating directly to the problem dealt with in the present study. As a result it was decided to conduct the study along guidelines suggested by Byram (1971), who emphasizes the importance of follow up studies in vocational education programs. Not only must such studies examine the vocational future of the graduates in the world of work, but where the training programs are designed for articulation purposes with post-secondary training programs this factor must also

be considered. In the latter case, states Byram, the emphasis must be on the adequacy of preparation for the post-secondary training program. Since the student attending automotive courses intending to become a motor mechanic must necessarily articulate with the apprenticeship program, such emphasis becomes of paramount importance.

The lack of previous studies into the problems dealt with in this study confirms the concept of this study being considered a pilot study.

CHAPTER 3

RESEARCH DESIGN AND PROCEDURE

The chapter describes the methods used in obtaining the required data. A description is given of the population and of the individual subgroups as well as the criteria for determining these subgroups. A description of the statistical methods used in analysing the data is also provided.

Research Design

The design of the research project was modeled after the recommendations presented by Good (1972) for general educational research. Special attention was paid to the characteristics of descriptive-survey studies. The purposes of descriptive-survey investigations were described by Good (1972:208) as being to secure evidence concerning an existing condition, to identify standards or norms with respect to comparing present conditions for future planning, and to determine how to make the next step having determined where we are and where we wish to go. Borg (1963:203) reiterates the above statement by saying that although descriptive studies probably always will be directed toward "what is", then many of the more recent surveys give us both a description of current status and a source of ideas for change and improvement.

The steps recommended by Good (1972:5) required in conducting research was followed. The problem was developed and defined and a survey was made of the related literature from which a formulation of working hypotheses was made. The latter was however deleted when the collected data indicated extremely small cell frequencies. The data gathering technique was designed and the actual collection was carried out. After classification and analysis conclusions and implications were drawn and recommendations made.

Identification of Population

The population for the research project consisted of all apprentices who had attended the Northern Alberta Institute of Technology or the Southern Alberta Institute of Technology for their fourth and final training program as motor mechanics during a one year period ending October 31, 1972.

The Apprenticeship Board was approached for cooperation in the project. A genuine interest was shown and all data required were made available to the researcher. Copies of the class records were provided for five classes from the Northern Alberta Institute of Technology and four classes from the Southern Alberta Institute of Technology. The population consisted of 346 apprentices in fourteen classes. From the class records were obtained the individual marks

scored by apprentices on the Apprenticeship Board examination, as well as the five subject marks at the institutes.

The individual files of the apprentices were then searched for information pertaining to previous training and education. The data collected consisted of high school credits, vocational education credits or vocational education course numbers for those apprentices who had had such previous training. If the individual apprentice had written any placement tests the results were recorded. If time credit had been granted the amount was noted along with possible technical periods granted. If there were any indications of the apprentice having presented high school credits or vocational credits for articulation purposes the time, institute, and classes attended for the third, second and first year technical periods were noted.

From the collected information the subgroup of apprentices with prior vocational education was identified. Class records containing members of the subgroup were then collected for the remaining technical periods. The populations for the four different technical periods differed from one another.

Table 1 indicates the distribution of

Table 1

Distribution of Apprentices With and Without
Vocational Training Prior to Apprenticeship
Based on Training Institution

Training institution	Apprentices			
	with prior training		without prior training	
	f	%	f	%
<u>First technical period</u>				
Fairview Agricultural and Vocational College	2	7.7	24	92.3
Lethbridge Community College	5	15.6	27	84.4
Northern Alberta Institute of Technology	25	6.4	368	93.6
Southern Alberta Institute of Technology	4	4.4	86	95.6
Totals	36	6.7	505	93.3
<u>Second technical period</u>				
Fairview Agricultural and Vocational College	3	27.3	8	72.7
Lethbridge Community College	3	14.3	18	85.7
Northern Alberta Institute of Technology	32	8.1	365	91.9
Southern Alberta Institute of Technology	11	8.6	117	91.4
Totals	49	8.8	508	91.2

Table 1 (continued)

Training institution	Apprentices			
	with prior training	without prior training		
	f	%	f	%
<u>Third technical period</u>				
Northern Alberta Institute of Technology	37	12.4	261	87.6
Southern Alberta Institute of Technology	26	12.8	177	87.2
Totals	63	12.6	438	87.4
<u>Fourth technical period</u>				
Northern Alberta Institute of Technology	41	19.2	173	80.8
Southern Alberta Institute of Technology	22	16.7	110	83.3
Totals	63	18.2	283	81.8

The percentages refer to the number of apprentices who attended the particular training institution. Percentages of totals refer to the number of apprentices who attended the particular technical period.

apprentices with vocational education prior to commencement of apprenticeship, and apprentices without such training, for the four technical periods. The table is based upon the training center the student attended for the particular training period. As the apprentices were on different time plans or programs due to time credits, and other factors, it became necessary to obtain more extensive class records for the third, second and first year technical periods than for the fourth.

The third and fourth year technical periods are only offered at the two institutes of technology. The second and first year periods are also offered at the Fairview Agricultural and Vocational College and the Lethbridge Community College. As a result the second year class records, or second technical period class records, were compiled from fourteen classes with a total of 540 students. Each class contained one or more apprentice having presented high school credits including vocational education credits for accreditation purposes. While a total of 63 students were identified as former vocational students in the fourth technical period the number for the first period was 36. The difference indicated the number of students having entered the program with advanced standings.

Classification of Data

All examination scores and ratings were recorded on standard 40 by 80 sheets. Each apprentice was assigned a code number for each of the four technical periods, if applicable, for identification purposes. Data in regard to high school credits, vocational credits, as well as time credits and technical periods granted by the Apprenticeship Board were recorded and coded. The data cards were then punched from the data sheets. The actual analysis was carried out on the electronic computing system provided by the University of Alberta.

Data conversion. Until 1971 the technical institutes and community colleges reported only one rating per apprentice to the Apprenticeship Board. The five subject marks of theory, shop, mathematics, science and business knowledge were compiled into one rating according to the percent of class time spent in each individual subject.

A change was made, however, to have all ratings reported to the Apprenticeship Board. The change from the one system to the other system took place at different times at the institutes and colleges involved. Some class records obtained consisted of the scores obtained by each student on the Apprenticeship Board examination and a combined rating for five subjects at

the training center. Other class records contained the marks for the individual subjects, a total of five marks, in addition to the Apprenticeship Board examination scores. Where five institute marks per student were obtained, a Fortran program was used to compute these marks into one rating using the formulae formerly applied by the training centers. The weighting factors, determined by the class time spent in the particular subject are shown in Table 2.

Table 2
Weighting Factors per Subject for Combined
Institute Ratings

Subject	Instructional hours per technical period		
	Hours per subject	Percent of total time	Weighting factor
Trade theory	80	33.33	.3333
Laboratory	120	50.00	.5000
Mathematics	16	6.67	.0667
Science	16	6.67	.0667
Business knowledge	8	3.33	.3333
Totals	240	100.00	1.0000

Variables

Comparison of achievement levels were based upon two variables for the first, second and third technical periods. The variables were the scores on the Apprenticeship Board examination and the combined rating from the training center.

For the fourth technical period six variables were used for comparisons. The Apprenticeship Board examination scores were used as for the previous technical periods. The remaining five variables were the training center marks in trade theory, laboratory or shop practice, mathematics, science and business knowledge.

Subgroups

The apprentices with vocational education prior to commencement of apprenticeship were grouped according to high school credentials and vocational credentials. One class of subgroups consisted of those students who had presented 100 or more high school credits, including vocational credits. Another class consisted of students who had presented fewer than 100 high school credits including vocational credits.

The subgroups were also classified according to the number of vocational credits presented for articulation purpose. One subgroup consisted of students with 35 or more credits in automotives, or

other applicable subjects. Another subgroup contained the students who had presented 20 or more, but fewer than 35 vocational credits. The last subgroup contained those students who had presented 10 or more credits, but fewer than 20 vocational credits. Apprentices presenting fewer than 10 vocational credits were not considered in the study as having prior vocational education.

Hence the students with a vocational education background were classified into two classes each containing three subgroups or a total of six subgroups.

Only the subgroup constituting apprentices with 100 or more high school credits, including 35 or more vocational credits were eligible for full advanced standings on the apprenticeship program and only if able to obtain pass marks on the two placement tests.

The vocational credit classification follows the credit system used by the Department of Education at the time these students commenced apprenticeship. At that time the larger composite high schools offered basically three courses in automotives. Automotives 10 was offered in grade 10 for 15 credits, automotives 20 was offered in grade 11 for 10 credits and automotives 30 was offered in grade 12 for 10 credits. Some smaller high schools were offering automotive courses numbered 12, 22 and 32 to meet local needs using

existing, but limited, facilities. The credits for these courses were determined by the Department of Education. Some of these courses carried a credit of less than 10. The parameters for the subgroups were established to take this factor into account.

Analysis of Data

In order to establish how and where the student with previous vocational education was placed upon articulation with the Apprenticeship Program, frequency counts and percentages were calculated for each subgroup. A Fortran IV program was used in connection with the DERS (Division of Educational Research Services, University of Alberta) NONP 10 program for use with non-parametric statistics. The findings are reported in Chapter 4.

A comparison of achievement levels for the different subgroups and populations through the four year program is reported in Chapter 5. The comparisons were based upon the number of high school credits, including vocational credits, the student had presented for articulation purposes. The statistical analysis was completed using the DERS: ANOV 15 program. This program carries out a standard one-way analysis of variance applying the fixed model for equal and unequal observations in each group. The computations included Scheffe's method for multiple comparisons of observed

means as described by Scheffe (1964:55). The method permits comparisons of two or more means and is applicable to groups containing unequal numbers of members. As the method is rigorous, Ferguson (1971:271) recommends a 0.1 level of significance be chosen rather than the 0.05 or 0.01 conventional levels. The recommendation was followed and 0.1 was chosen as the level of significance for this thesis.

A comparison of achievement levels is also reported in Chapter 6. The comparisons were based upon the results of the placement tests conducted by the Apprenticeship Board. The amount of vocational education prior to commencement of apprenticeship was disregarded for this part of the study. The statistical computations were carried out in the same manner, determining achievement levels based upon the actual placement. The latter aspect of the research project was carried out to determine the validity of the applied accreditation policy. The level of significant differences between means was also set at the 0.1 level.

Percentages are all reported to one decimal place except where total percentages are reported. In this case it was necessary at times to report to two decimal places.

Summary

A description has been presented outlining the steps taken to complete the research project. The populations were defined. The process of collecting the necessary data was explained. The parameters for the subgroups were established after the original population members' individual files had been searched. Details were listed in regard to the statistical methods of computation used to answer the specific problems in the project.

Chapter 4

ANALYSIS OF POLICY FOR VOCATIONAL EDUCATION STUDENTS ARTICULATING WITH THE APPRENTICESHIP BOARD

The research project was designed to examine two specific problems. The first problem was to determine the effects of high school credentials and placement test results upon placement of former vocational high school students on accelerated apprenticeship programs with advanced standings. The second problem was to determine how these students achieved on the programs in comparison with apprentices without such previous training. The problem of articulation is analyzed in this chapter.

The trade selected for examination was the motor mechanic trade. The standard, or normal, program for motor mechanic apprentices consists of four years' work experience served under the guidance of a licensed motor mechanic on the job site. Once a year during the four year program the apprentice must attend one of the provincial training institutions for an eight week course referred to as a technical period. He will in this period attend formal classes in trade theory and shop or laboratory practices, as well as the related or supporting subjects of mathematics, science and

business knowledge.

The minimum formal education required for apprenticeship in the motor mechanic trade is grade nine or equivalent. The accelerated program was designed to permit the candidate for apprenticeship with prior vocational preparation to complete the program over a shorter period of time. On the standard program an apprentice must work a minimum of 1400 hours a year on the job site. On the accelerated program the required number of hours may be reduced to a minimum of 900 hours. The time required to complete the program for the student on the accelerated plan is thus reduced to three years rather than four years.

Furthermore the apprentice may be accredited with the first and second technical periods if he meets the criteria for a full advanced standing. He is thus not required to attend any of the training centers before the third technical period.

The accelerated program with an advanced standing is available to former vocational students presenting 100 high school credits or more including a minimum of 35 credits in an applicable vocational program. Furthermore it is stipulated that the candidate for apprenticeship seeking articulation must pass the appropriate examinations conducted by the Apprenticeship Board for motor mechanic apprentices

who attended the first and second technical periods respectively. Students not meeting the criteria may be considered for lesser credits on the apprenticeship program.

The scores obtained on the examinations conducted by the Apprenticeship Board after the first and second technical periods are determining factors in the decisions to promote apprentices from one technical period to the next. When the identical examinations are administered to candidates for apprenticeship with a vocational education background they are referred to as placement tests.

The total number of apprentices who presented high school credits, including vocational education credits for articulation purposes was 63. Table 3 shows the actual distribution according to high school credits and vocational credits.

First Placement Test

The subgroup parameters were based upon 100 or more high school credits, and less than 100 high school credits. Three intervals were selected for classification of vocational credits. The three intervals also represented the number of vocational credits generally earned in grades ten, eleven and twelve.

Table 3

Distribution of Apprentices With Vocational Training
 Prior to Commencement of Apprenticeship
 According to High School and
 Vocational Credits

High school credits	Vocational credits	f	%
≥ 100	≥ 35	28	44.4
≥ 100	20 - 34	4	6.3
≥ 100	10 - 19	2	3.2
< 100	≥ 35	6	9.5
< 100	20 - 34	11	17.5
< 100	10 - 19	12	19.1
Totals		63	100.0

According to the data, 28 (44.4%) of the students were eligible to write the first placement test, and if a pass mark of 65 was obtained, then to write the second placement test for full advanced standing on an accelerated program. The remaining 25 (55.6%) could be granted permission to write the placement tests at the discretion of the Apprenticeship Board. Criteria for this permission are not specified by the Board.

The number of students who actually wrote the first placement test is shown in Table 4 based upon the

number of high school credits and vocational credits presented.

Table 4

Distribution of Apprentices Who Wrote the First Placement Test Based Upon High School Credentials

High school credits	Vocational credits	Wrote the test		Did not write the test	
		f	%	f	%
≥ 100	≥ 35	26	92.9	2	7.1
≥ 100	20 - 34	2	50.0	2	50.0
≥ 100	10 - 19	1	50.0	1	50.0
< 100	≥ 35	4	67.7	2	33.3
< 100	20 - 34	5	45.5	6	54.5
< 100	10 - 19	3	25.0	9	75.0
Totals		41	63.5	22	36.5

Nearly all students eligible to write the first placement test did so. The data did not disclose why two (7.1%) did not write the placement test although they had presented the required high school courses including the required vocational credits. It must be noted, however, that it is not mandatory for the students to write the test.

Students presenting fewer than the required credits for full advanced standings may be granted permission and may then elect to write the first placement test. Less than half (42.9%) of these students wrote the test. Six students had insufficient vocational credits, but the required high school credits. Three (50%) wrote the test.

Six students had less than the required high school credits, but the required vocational credits. Of these students, four (66.7%) wrote the first placement test.

Test of Independence of Variables. Ferguson (1972:182) suggests the use of chi-square test of independence for determining association between variables. The data in Table 4 were used for constructing contingency tables, and computations were performed using Yates' correction for small cell frequencies.

Cells were constructed with two variables being denoted as having written the first placement test, and not having written the test.

The apprentices were then classified into two groups. One group consisted of members having presented the required high school and vocational credits required for advanced standings. The other group contained members with insufficient credits. The

obtained chi-square indicated that high school credentials were associated with writing the first placement test. More students with the required number of credits than students with less than the required credits wrote the placement test.

The students with insufficient high school credentials were then grouped into two groups. One group contained students with 100 or more high school credits. Another group contained students with less than 100 high school credits. The chi-square test indicated that high school credits were independent variables of being granted permission to write the test for students who did not meet the stipulated criteria. A similar analysis with the students grouped according to vocational credits produced a similar result.

Results of the First Placement Test. The placement test is identical to the final examination all apprentices must write at the conclusion of the first technical period. The test is referred to as an external examination in that it is constructed and conducted by the staff of the Apprenticeship Board. The instructional staffs of the various technical institutes and colleges may be consulted as to the formulation of the individual test items being used on the multiple choice test. After the first draft of a new examination its specific content remains

confidential to the officers of the Apprenticeship Board until it is presented to the apprentices. The pass mark for the test has been set at 65.

The results of the first placement test, based upon the credentials presented for accreditation purposes, is reported in Table 5.

Table 5

Pass and Fail Marks on the First Placement Test
Based Upon High School Credentials

Previous training		Pass mark		Fail mark	
High school credits	Vocational credits	f	%	f	%
≥ 100	≥ 35	18	69.2	8	30.8
≥ 100	20 - 34	2	100.0	0	0.0
≥ 100	10 - 19	1	100.0	0	0.0
< 100	≥ 35	3	75.0	1	25.0
< 100	20 - 34	1	20.0	4	80.0
< 100	10 - 19	2	66.7	1	33.3
Totals		27	65.9	14	34.1

Any specific pattern for pass and fail marks could not be identified due to the low cell frequencies in some cells. The two groups containing students with the required number of high school

credits, but insufficient vocational credits, had a one hundred percent pass record. Indeed these two groups had pass mark rates higher than any other group.

Particularly noticeable was the result for the group with full credits in academic and vocational aspects. In this group 8 (30.8%) students did not obtain pass marks. These students were the ones eligible to write the test to meet the criteria for full advanced standing on an accelerated program.

The lowest pass mark rate of 20 percent was obtained by students with insufficient high school credits and from 20 to 34 vocational credits.

Also of interest was the pass mark rate obtained by the students with the least credentials. These students obtained a rate just slightly below that of the students with the highest credentials.

Test of Independence of Variables. The chi-square test of independence of variables with Yates' correction for small cell frequencies was applied to contingency tables constructed from the data in Table 5 on page 54. The variables were high school credentials grouped according to high school credits and vocational credits and placement test results grouped according to pass and fail marks.

The students having presented the required high school credentials for full advanced standings were

compared with students with less credits. The chi-square test indicated that high school and vocational credits were independent variables of pass and fail marks.

A second test compared students with the required number of high school credits, but insufficient vocational credits or insufficient high school credits but the required number of high school credits, with students with insufficient high school as well as vocational credits. The test confirmed the finding that high school and vocational credits were independent variables of pass and fail marks on the first placement test.

Maintaining the pass and fail variables, but basing the subgroups according to one hundred high school credits or more, and less than one hundred high school credits indicated that high school credits were independent variables of pass and fail marks.

Repeating the last test, but with the subgroups composed of apprentices with 35 or more vocational credits and less than 35 vocational credits indicated that vocational credits were independent variables of pass and fail marks on the first placement test.

The written multiple choice test depends to a large degree upon the examinee's ability to communicate through the written language, and does not necessarily reflect upon this person's ability to perform manual

skills and operate sophisticated and/or simpler mechanical equipment and instruments.

Group Means on the First Placement Test. In order to compute the means and standard deviations of the scores obtained on the first placement test it was necessary to reduce the original six groups to five groups. One group with but one member, having presented 100 high school credits and 10 - 19 vocational credits was eliminated, as indicated in Table 6.

Table 6
Means and Standard Deviations of Scores
on the First Placement Test Based
Upon High School Credentials

Previous training		First placement test		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	26	65.6	9.8
≥ 100	20 - 34	2	69.5	6.4
≥ 100	10 - 19	1	74.0	-
< 100	≥ 35	4	60.8	11.3
< 100	20 - 34	5	53.8	8.3
< 100	10 - 19	3	63.7	6.7
Totals		40	63.7	9.8

This particular member's score was included in Table 6 which shows the means and standard deviations resulting from the scores on the first placement test.

The computation indicated that there were no significant differences between the means of the groups.

The pass mark for the particular test was set at 65 percent by the Apprenticeship Board. Only three groups obtained means equal to or higher than the established pass mark. These groups all contained students meeting the criteria for high school credits. The students with the most vocational credits obtained the lowest means, and the students with the least vocational credits obtained the highest means. As previously mentioned, one group was excluded from the computational program, but included with a notation in the table.

The group of students with the fewest number of high school credits and fewest number of vocational credits has a mean equal to the overall or grand mean. This grand mean of 63.7 was also below the established pass mark for the test.

The standard deviations ranged from 6.4 to 11.3 with the latter being in regard to the group with less than full high school credits but 35 or more credits in vocational education. Hence the greatest variability existed among the members belonging to this group.

The scores obtained on the test were used by the Apprenticeship Board to determine the granting or denial of credits for the first technical period, the granting of time credits through an accelerated program and whether or not the student was to write the second placement test. An analysis of actual placement on the apprenticeship program is presented in a later section.

Second Placement Test

The subgroup parameters for analyzing the results of the second placement test were identical to the ones used for the first placement test. The subgroup intended for students with fewer than 100 high school credits, including fewer than 20 vocational credits, was deleted as no member belonged to that group.

Table 7 shows the frequencies of students who wrote the second placement test and the students who did not write the test. Only the students who had passed the first placement test and thus were eligible to write the second test were included.

A total of 27 students with various qualifications passed the first placement test. Of these 15 (55.6%) wrote the second test with 11 (73.3%) belonging to the group consisting of students meeting the criteria for full advanced standings on an accelerated program.

Table 7

Distribution of Apprentices Who Wrote the Second
Placement Test Based Upon High
School Credentials

High school credits	Vocational credits	Wrote the test		Did not write the test	
		f	%	f	%
≥ 100	≥ 35	11	61.1	7	38.9
≥ 100	20 - 34	1	50.0	1	50.0
≥ 100	10 - 19	1	100.0	0	0.0
< 100	≥ 35	1	33.3	2	66.7
< 100	20 - 34	1	100.0	0	0.0
< 100	10 - 19	0	0.0	2	100.0
Totals		15	55.6	12	44.4

Due to the low number of members in all groups but one, it was impossible to determine any pattern or criteria for eligibility for writing the second placement test.

Test of Independence of Variables. The students were classified into those who had written the second placement test and those who had not written the test. Further classification was made by grouping the two classes into those with full high school credits, and those with insufficient high school credits or

vocational credits. The chi-square test for independence of variables was applied. The result indicated that high school credits and vocational credits were independent variables of the granting of permission to write the second placement test.

The former classification was retained, but a change was made in the subgroup parameters. One group contained students with the required number of high school credits but insufficient vocational credits, and students with insufficient high school credits but the required number of vocational credits. Another group contained students with insufficient high school credits as well as insufficient vocational credits.

The chi-square test for independence of variables was again applied. The result indicated that high school credits and vocational credits, when less than required for full advanced standings, were independent variables of the granting of permission to write the second placement test.

Results of the Second Placement Test. The pass mark for the second placement test has been set by the Apprenticeship Board to be 65. Table 8 shows that all students but one obtained a pass mark on the test. An overall pass rate of 93.3 percent was established.

Table 8

Pass and Fail Marks on the Second Placement Test
Based Upon High School Credentials

Previous training		Pass mark		Fail mark	
High school credits	Vocational credits	f	%	f	%
≥ 100	≥ 35	10	90.9	1	9.1
≥ 100	20 - 34	1	100.0	0	0.0
≥ 100	10 - 19	1	100.0	0	0.0
< 100	≥ 35	1	100.0	0	0.0
< 100	20 - 34	1	100.0	0	0.0
Totals		14	93.3	1	6.7

Particularly noticeable is that all students with less than the required high school credits, including vocational credits, who wrote the test obtained a pass mark. Also of interest was the disclosure that 90.9 percent of the students entitled to write the test obtained a pass mark.

Group Means on the Second Placement Test. The frequencies and scores obtained on the second placement test are listed in Table 9. Only means for groups containing two or more are shown. For groups containing but one member, the score only is listed.

Table 9

Frequencies and Means of Scores Obtained
 on the Second Placement Test Based Upon
 High School Credentials

Previous training		Second placement test		
High school credits	Vocational credits	f	%	Mean
≥ 100	≥ 35	11	73.3	66.2
≥ 100	20 - 34	1	6.7	71.1 ^a
≥ 100	10 - 19	1	6.7	70.0 ^a
< 100	≥ 35	1	6.7	65.0 ^a
< 100	20 - 34	1	6.7	82.0 ^a
< 100	10 - 19	-	-	-
Totals		15	100.0	67.7

^a denotes actual scores and not means.

There were no members in the group for students with fewer than 100 high school credits, including 10 - 19 vocational credits.

Due to the low cell frequencies in most cells meaningful computations could not be performed without combining some of the groups. One observation was that the student with the least preparation obtained the highest score on the test.

For meaningful computations it became necessary

to collapse some of the subgroups. The students with the required number of high school credits including the required number of vocational credits were grouped into one group. The students with insufficient high school credits or vocational credits, or insufficient credits in both aspects were grouped into the other group.

Computations were then made to determine means and standard deviations for the two groups. Table 10 shows the data resulting.

Table 10

Means and Standard Deviations of Scores
on the Second Placement Test Based
Upon High School Credentials

Previous training		Second placement test		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	11	66.2	3.2
≥ 100	< 35	4	72.0	7.2
	≥ 35			
Totals		15	67.7	4.9

The difference between means was significant.

The group containing students with the least

number of high school credits including vocational credits obtained a mean considerably higher than the mean obtained by the students with the better qualifications. The former group obtained a mean of 72.0 as compared with the mean of 66.2 for the latter.

ADVANCED STANDINGS BASED UPON PLACEMENT TESTS

Statements from the Alberta Apprenticeship Board and the Alberta Department of Labour list several criteria for the apprenticeship candidate to meet in order to secure an advanced standing on an accelerated program. Apart from the required high school credits, including the required vocational credits, the students must pass the two placement tests to ensure full advanced standings with credits for the first two technical periods. If the students do not meet these criteria they can expect to be considered for lesser credits on the basis of individual performances upon undertaking apprenticeship.

Credits for the First Technical Period.

A total of 63 apprentices had been identified as having presented high school credentials for the purpose of articulating with the apprenticeship program. The criteria for obtaining credit for the first technical period was attainment of a pass mark of 65

on the first placement test. All students who obtained a pass mark were given credit for the first technical period. Table 5 on page 54 shows a total of 27 (65.9%) of the students who wrote the test obtained a pass mark.

The chi-square test of independence of variables previously applied to the data from Table 5 on page 54 in regard to pass and fail marks was also applicable to credits granted for the first technical period. The various tests indicated that high school credits, vocational credits and combinations thereof were independent variables in respect to credits granted for the first technical period.

Credits for the Second Technical Period

Granting of credit for the second technical period depended on obtaining a pass mark of 65 on the second placement test. Table 8 shows that 14 (93.3%) students who wrote the test obtained a pass mark. These students were all given credits for the second as well as for the first technical period. An exception existed. One student who had presented fewer than 100 high school credits, including 20 - 34 vocational credits, did not write the first placement test, but attended one of the training centers for the first technical period. Rather than attend the second technical period, he was granted permission to write

the second placement test. He obtained a pass mark on this test and was granted credit for the second technical period.

Time Credits Compared with Test Results

The advanced standing through the granting of one or two technical period credits is interrelated to the granting of time credits toward the time required in gaining work experience on the job site. The maximum reduction in time to be served is three months per year for the four year program. When a student is granted time credits he is placed on an accelerated apprenticeship program. The data obtained indicated two classes of time credits granted, constituting a three month reduction per year or one and one half month reduction per year.

Table 11 shows the application of the accelerated programs according to the scores obtained on the two placement tests.

All students who wrote the first and the second placement tests and obtained pass marks were placed on the accelerated program reducing total time to be served by three months per year. The trend was similar for the students who wrote only the first test and either did not write the second test, or failed the first test. A change occurred in regard to the students who for various reasons did not write the first

Table 11

 Frequencies and Percentages of Students on
 Accelerated Programs Based Upon Results
 of Placement Tests

Placement test results	Time reductions per year					
	3 month		1½ month		no reduction	
	f	%	f	%	f	%
Passed both tests	13	100.0	-	-	-	-
Passed the first, failed the second	1	100.0	-	-	-	-
Passed the first, did not write the second	12	92.3	-	-	1	7.7
Failed the first	10	71.4	-	-	4	28.6
Did not write the first	1	4.8	4	19.0	16	76.2
Passed the second, did not write the first	-	-	-	-	1	100.0
Totals	37	58.7	4	6.4	22	34.9

placement test. A majority of these students were not placed on accelerated programs while some were placed on programs reducing the time to be served by one and one half month per year for a total reduction of six month. An illustration is shown in Figure 2 on page 70.

One student who attended the first technical

period and then wrote the second placement test was not granted time credits.

Ten students (71.4%) who failed the first placement test were granted full time credit, while four (28.6%) students with the same qualifications were not granted time credit.

A majority of the students who passed the first placement test, and the students who also passed the second placement test, were placed on an accelerated program, while a majority of the students who did not write any of the tests were not granted any reduction in time.

Test of Independence of Variables. The chi-square test of independence of variables was applied to the data presented in Table 11 on page 68. Computations indicated that the granting of time credits was a dependent variable of the test results.

A similar test indicated that failing the first placement test and not writing the test were dependent variables of granting of time credits with a majority of the students who did not write the test not being granted time credits. Any specific criteria for the granting of time credits could not be established apart from the observation that writing a placement test was associated with the granting of time credits.

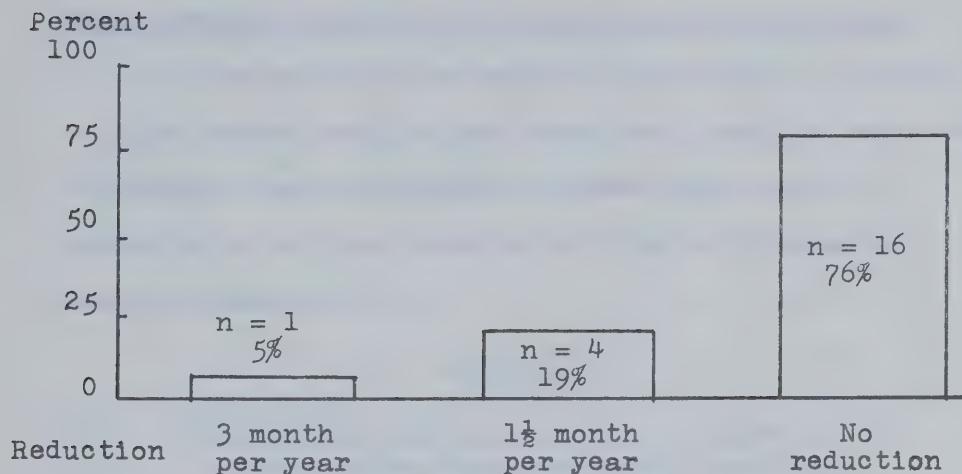


Figure 2

Time Credits Granted Vocational High School Students
Who Did Not Write Placement Tests

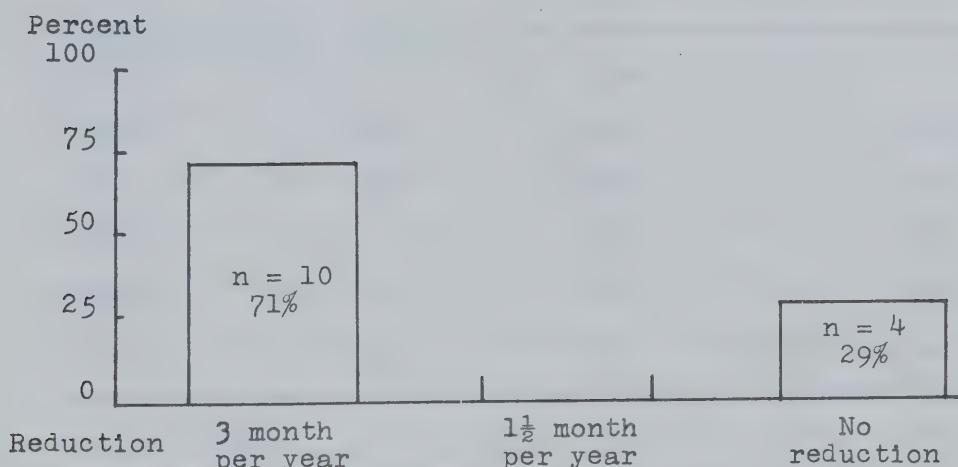


Figure 3

Time Credits Granted Vocational High School Students
Who Failed the Placement Tests

Time Credits Compared with High School Credentials

The subgroup parameters established in regard to high school credits and vocational credits were used to examine the relationship between high school credentials and the granting of time credits as is shown in Table 12.

Table 12

Frequencies and Percentages of Students on Accelerated Programs Based Upon High School Credentials

High school credits	Vocational credits	Time reductions per year					
		3 month		1½ month		no reduction	
		f	%	f	%	f	%
≥ 100	≥ 35	27	96.4	1	3.6	-	-
≥ 100	20 - 34	2	50.0	-	-	2	50.0
≥ 100	10 - 19	1	50.0	-	-	1	50.0
< 100	≥ 35	3	50.0	-	-	3	50.0
< 100	20 - 34	2	18.2	1	9.1	8	72.7
< 100	10 - 19	2	16.7	2	16.7	8	66.6
Totals		37	58.7	4	6.4	22	34.9

Nearly all students who had presented the required number of high school credits, including the required number of vocational credits, for articulation

purposes were granted the maximum reduction in time to be served.

Half of the students with the required high school credits, but insufficient vocational credits were granted full time credit. The other students with the same credentials were not granted any time credit.

Some students with insufficient high school credits as well as insufficient vocational education credits were granted the maximum time credits, some were granted the minimum time credits and others were not granted any reduction in time to be served.

Test of Independence of Variables. Contingency tables were constructed from the data in Table 12 on page 71. The apprentices were grouped according to high school and vocational credits and according to time reductions granted.

The chi-square test of independence of variables indicated that high school credentials were dependent variables of granting of time reductions. The cell parameters were based on sufficient high school and vocational credit and insufficient credits.

When the cell parameters were changed to contain apprentices with insufficient high school credits or insufficient vocational credits, and insufficient high school as well as insufficient vocational credits, it was found that high school

credentials were independent variables of time reductions.

When considering vocational credits only it was found that these variables were dependent of time reduction. Similar findings resulted when high school credits were considered.

Although associations were discovered between high school credentials and time reduction, any criterion for the granting of time reductions for apprentices with less than the required credentials could not be determined.

Graphical illustrations relating high school and vocational credits to granting of time reductions are presented in Figures 4, 5 and 6 on pages 74 and 75.

Summary

One purpose for the project was to determine to what degree former high school students with credits in vocational education from Alberta high schools were accredited for their previous training and education when articulating with the Alberta Apprenticeship Board.

From the population of motor mechanic apprentices graduating over a one year period, 63 apprentices were identified as having attended vocational education courses. Less than fifty percent of these students had been able to present the required number of high school credits, including credits in

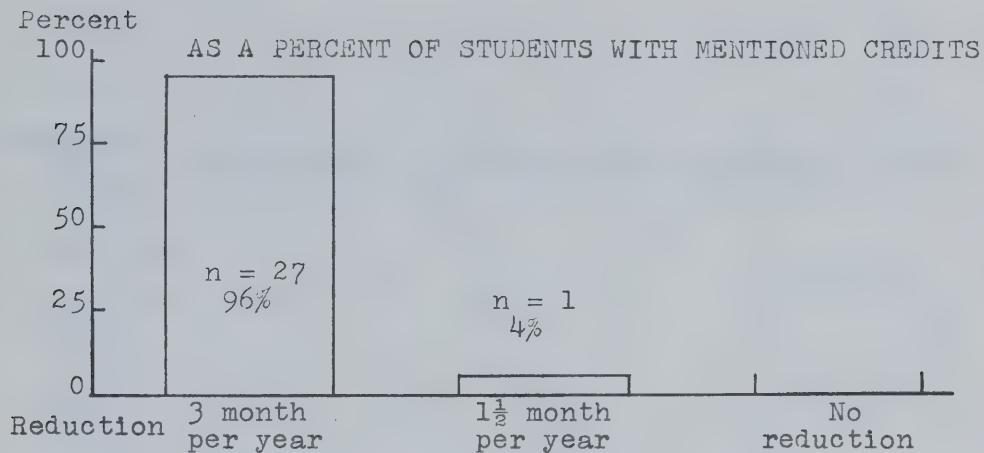


Figure 4

Time Reductions Granted Students with 100
or more High School Credits Including
35 or more Vocational Credits

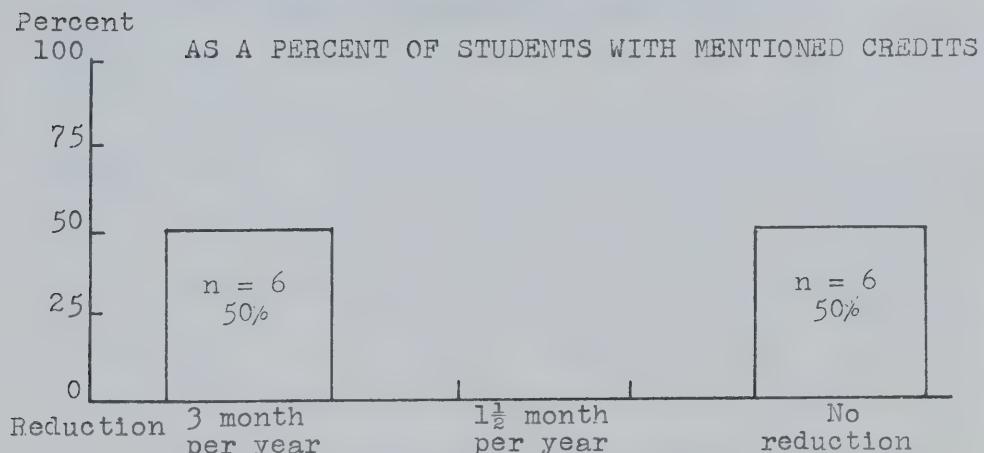


Figure 5

Time Reductions Granted Students with 100 High School
Credits Including Less than 35 Vocational Credits,
and Students with Less than 100 High School Credits
Including 35 or More Vocational Credits

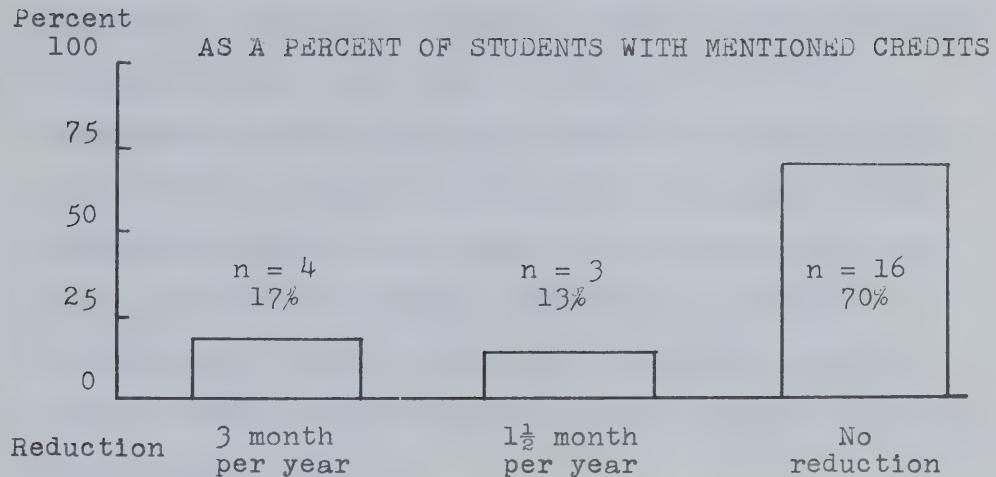


Figure 6

Time Reductions Granted Students with Less than
100 High School Credits Including Less
than 35 Vocational Credits

vocational courses, making them eligible to write the placement tests for advanced standings on accelerated programs. Nearly all eligible students wrote the first placement test. More than 60 percent of all the vocational students did write the first placement test. A criterion could not be identified in regard to which factors determined the eligibility to write the first placement test for students with fewer than the required high school credits and vocational credits. Some of these students wrote the test and some students did not write the test.

There were no differences between the group means, based upon previous training and education, on the first placement test reaching the level of significance.

Of the 41 students who wrote the first placement test, two thirds obtained pass marks and were credited with the first technical period.

Less than 25 percent of the vocational students proceeded to write the second placement test. The ones who did write the test had a pass mark rate of over ninety percent. These students were granted credit for the second technical period as well as the first one. There was a difference between means on the second placement test reaching the level of significance. The students with insufficient credits had a mean

higher than that of students with the required high school credentials for full advanced standings.

Nearly all students who wrote placement tests were placed on accelerated programs. Attainment of pass marks on either the first placement test or on both placement tests resulted in granting of maximum time reductions.

Approximately two thirds of the students who failed the first placement test were granted the maximum reduction in time while one third did not receive any reduction. Criteria for granting of time credits to students who had failed the first placement test could not be identified.

A majority of the students who did not write placement tests was not granted time reductions. Some students were however granted a reduction of one and one half month per year. One student was granted the maximum reduction of three month per year. Criteria for granting of time credits to students who did not write placement tests could not be identified.

Figure 7 illustrates the actual articulation process of the 63 former vocational high school students continuing their training with the apprenticeship program. Only vocational credits were considered. Figure 8 illustrates the same process based upon high school credits.

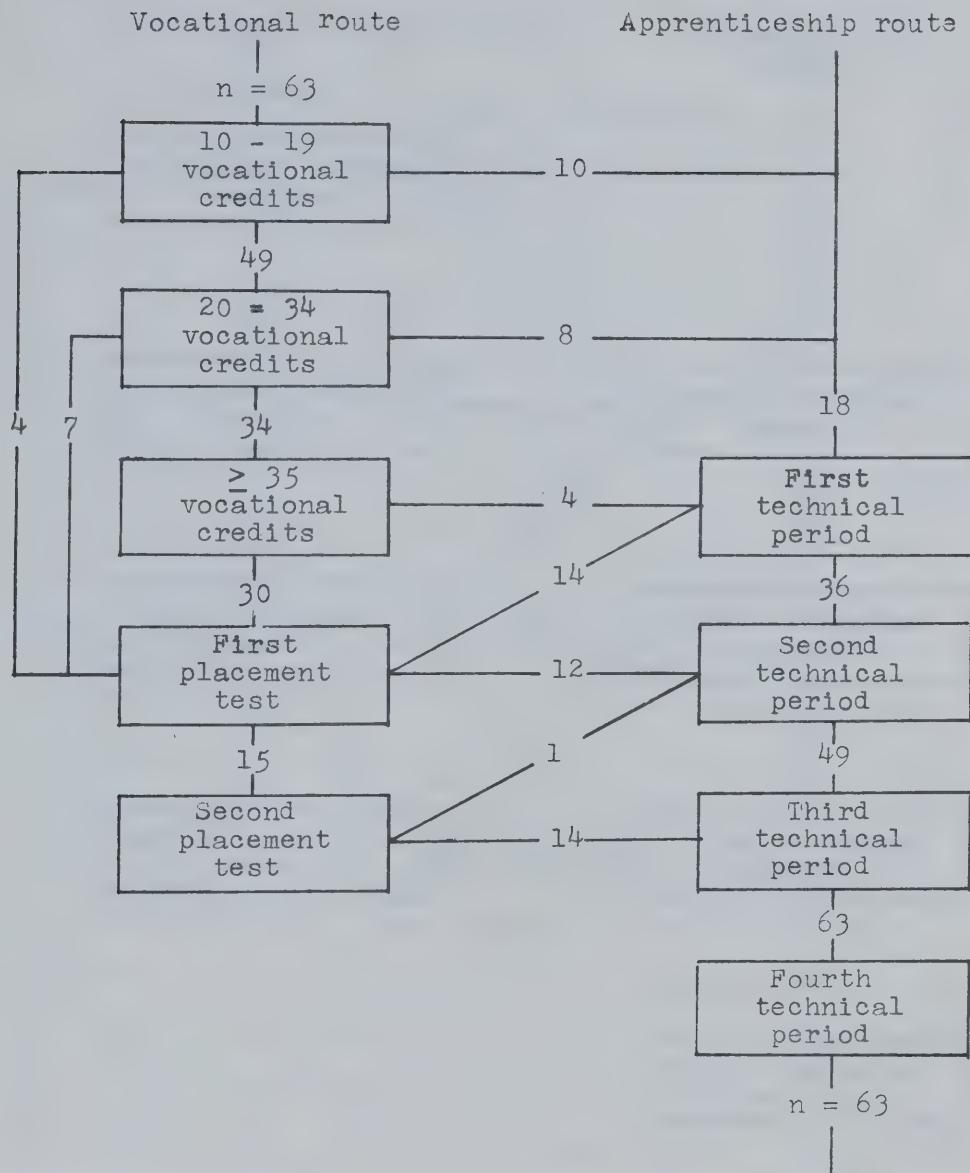


Figure 7

Articulation of Vocational High School Students
with Apprenticeship Program Based Upon
Vocational Education Credits

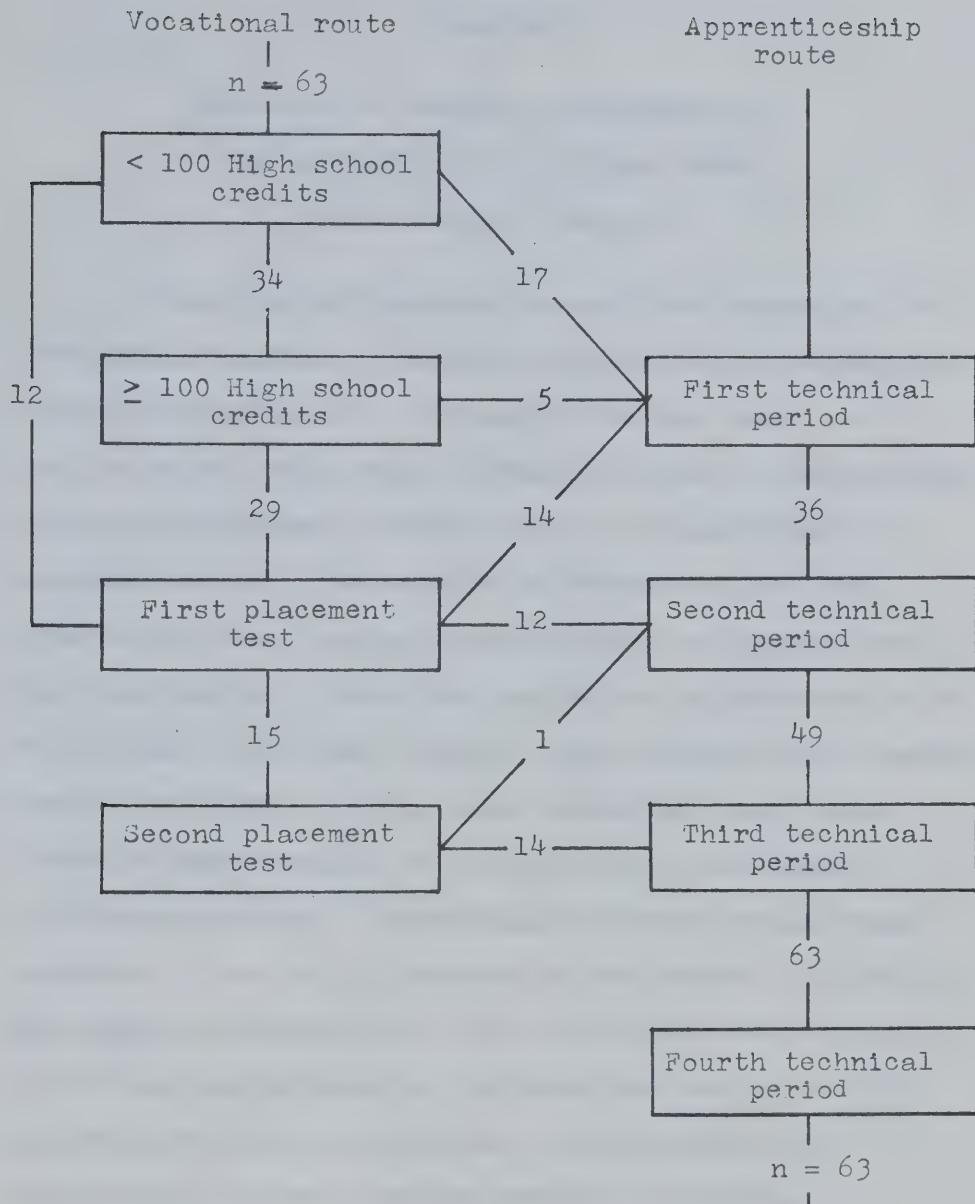


Figure 8

Articulation of Vocational High School Students
with Apprenticeship Program Based
Upon High School Credits

Chapter 5

ANALYSIS OF STUDENT ACHIEVEMENT ON THE APPRENTICESHIP PROGRAM BASED UPON PREVIOUS TRAINING

The chapter presents an analysis comparing the achievement levels of apprentices who had presented high school credentials to the Apprenticeship Board for articulation, with the achievement levels of apprentices without vocational training prior to commencement of apprenticeship. The population researched was the graduating motor mechanic apprentices in Alberta over a one year period. From the population, apprentices with vocational high school credits from Alberta high schools were identified. It was also determined when these students had attended the first, second and third technical periods. Class data for these periods were obtained. Due to differences in the number of students who can be accommodated in the different institutions providing apprenticeship training, and due to apprentices being on different time programs, the populations varied from one period to another.

Variables

The first section of the chapter examines the achievement levels in the first technical period. The curriculum for this period is somewhat similar to that

of Automotives 10 and Automotives 12 in the high school program.

Two variables were considered. At the conclusion of the training period at the technical institute, or college, the apprentice writes an examination conducted by the Apprenticeship Board. The score obtained on this examination was one variable considered.

The second variable was the score obtained by the apprentice while attending the training institute. A mark is given in each of five subjects including theory, shop or laboratory practice, mathematics, science and business knowledge. The five individual scores were combined into one rating referred to as an institute rating. The computation of the rating was accomplished by applying a weighting factor to each subject mark in ratio to the class time spent in that subject.

Subgroups

The subgroups were collapsed from the original six groups used in Chapter 4 for determining the accreditation policy, to four groups. The smaller number of groups was required due to low cell frequencies in some cells. The first group consisted of apprentices who had presented a minimum of 100 high school credits of which 35 or more were in automotive

vocational courses. This criterion is also one of the requirements for being granted full advanced standing on the apprenticeship program.

The second subgroup consisted of students with 100 or more high school credits including less than 35 vocational credits, and students with less than 100 high school credits but including 35 or more vocational credits. Thus this group had insufficient credits in one or the other aspect.

The third group consisted of students with insufficient credits in both total high school credits and in vocational credits. The number of high school credits was thus fewer than 100 and the number of vocational credits was fewer than 35. An advanced standing may be gained with this qualification, although it is at the discretion of the Apprenticeship Board and as a result of the placement test if written.

COMPARISONS OF MEANS IN THE FIRST TECHNICAL PERIOD

Computations were made using the ANOV 15 program for determining means, standard deviations and variances. The level of significance of differences between group means was set at the 0.1 level.

Apprenticeship Board Examination

The data for the Apprenticeship Board conducted examination for the first technical period are shown in Table 13. Although no significant differences existed between the means, minor differences did exist.

Table 13

Means and Standard Deviations of Scores Obtained by Apprentices With and Without Vocational Training Prior to Apprenticeship on the Apprenticeship Board Examination for the First Technical Period

Previous training		Final examination		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	10	71.6	4.4
≤ 100	< 35	6	76.8	8.7
≤ 100	≥ 35			
< 100	< 35	20	77.9	7.8
	No previous training	505	73.1	8.7
Totals		541	73.3	8.6

The differences between means were not significant.

The full credit group had the lowest standard deviation of 2.2 below the grand mean. A great uniformity, or narrower range was displayed by this group. The students with full credit had either failed the first placement test or had not attempted this examination.

Institute Combined Rating

The institute rating for the first technical period was compiled from the five subject marks according to the specified formula. The data are presented in Table 14.

The greatest difference between means was between the group of full credit students and the group of students with insufficient credits in both high school credits and vocational credits. The latter had the higher mean.

There were no differences between the means of the groups reaching the level of significance at the 0.1 level. Differences below this level did exist. The highest mean of 72.6 for the group with the least amount of credits thus differed considerably from the group with the highest amount of credits obtaining a 65.1 mean.

Table 14

Means and Standard Deviations of Scores Obtained by Apprentices With and Without Vocational Training Prior to Apprenticeship on the Combined Institute Rating for the First Technical Period

Previous training		Institute rating		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 100	10	65.1	7.8
≥ 100 ≤ 100	< 35 ≥ 35	6	70.0	6.8
< 100	< 35	20	72.6	7.1
	No previous training	505	69.7	9.0
Totals		541	69.7	8.9

The differences between means were not significant.

Summary. The individual groups were compared on two variables for the first year technical period. Although no significant differences between groups existed at the 0.1 level of significance, minor differences were indicated. The group with no previous training had a mean at par with the grand mean. The lowest mean was obtained by the group with the most

high school credits and vocational credits, and the highest mean was obtained by the students with a minimum of high school credits and vocational credits.

COMPARISON OF MEANS IN THE SECOND TECHNICAL PERIOD

The comparison was based on the same two variables for this period as was used for the first technical period. The first variable considered was the scores or ratings obtained by the apprentices on the final examination sponsored by the Apprenticeship Board. The second variable was the combined rating of theory, shop, mathematics, science and business knowledge obtained at the institutes.

The group classification was identical to the one utilized in analyzing the first technical period scores. The first group consisted of students with the required levels of high school credits and vocational credits. The second group contained students with the required number of high school credits but an insufficient number of vocational education credits, or an insufficient number of total high school credits, but with the required amount of vocational credits. The third group consisted of students with some vocational education prior to commencement of apprenticeship but insufficient

vocational credits as well as total high school credits for full advanced standings. These groups were then compared with the students without any previous vocational education and with the total population.

Apprenticeship Board Examination

The analysis is presented in Table 15 for the Apprenticeship Board examination.

Table 15

Means and Standard Deviations of Scores Obtained by Apprentices With and Without Vocational Training Prior to Apprenticeship on the Apprenticeship Board Examination for the Second Technical Period

Group no.	Previous training		Final examination		
	High school credits	Vocational credits	f	Mean	S.D.
1	≥ 100	≥ 35	18	69.4	8.4
2	> 100 ≤ 100	< 35 ≥ 35	9	76.1	5.8
3	< 100	< 35	22	75.9	5.1
	No previous training		508	72.8	7.7
Totals			557	72.8	7.7

The difference between the means of groups 1+3 was significant.

Although several sizeable differences were present only one difference was significant. The group containing students with 100 high school and 35 vocational credits had a mean significantly lower than the mean of the students who had attended vocational courses but were unable to present the credentials sufficient for full advanced standings.

The standard deviations varied from a low of 5.1 for the group with the least previous training to 8.4 for the group with the most previous training. Higher and lower extreme scores were thus present in the group with the required amount of high school credits and vocational credits than in other groups.

Institute Combined Rating

The analysis of the combined institute rating for the second technical period is presented in Table 16. There were no differences between means of the various groups at the 0.1 level of significance.

Minor differences existed between some of the groups. The group with the most high school credits and most vocational credits attained a mean of 70.4 which was also the lowest mean.

Table 16

Means and Standard Deviations of Scores Obtained
by Apprentices With and Without Vocational
Training Prior to Apprenticeship on the
Combined Institute Rating for
the Second Technical Period

Previous training		Institute rating		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	18	70.4	7.5
> 100	< 35	9	74.9	5.0
≤ 100	≥ 35			
< 100	< 35	22	74.9	4.6
	No previous training	508	72.7	6.8
Totals		557	72.7	6.7

There were no significant differences between means.

Summary. Apprentices with vocational education prior to commencement of apprenticeship were compared with apprentices without such training on the second technical period ratings. There were no significant differences between achievement levels based upon group means on the combined institute rating.

On the Apprenticeship Board examination the group containing members with the required number of

high school and vocational credits obtained a mean significantly lower than the means of apprentices with either insufficient high school credits, or insufficient vocational credits.

COMPARISON OF MEANS IN THE THIRD TECHNICAL PERIOD

The comparison of achievement levels for apprentices having received vocational training in the high school system and apprentices without such training was made in the same manner as for the first and second technical periods.

The group classifications were retained and the two variables, Apprenticeship Board examination scores, and institute combined ratings, were used. The number of members in each group as well as population differed from those in the first two technical periods. Students who obtained pass marks on the first and second placement tests were included as subgroups.

The third technical period curriculum consisted of subject material related to engine performance, instrumentation and auxiliary equipment necessary for the operation of the automobile. Scientific principles at the theoretical level are more predominant in this phase of the apprenticeship training than in other technical periods. The

vocational high school curriculum prior to 1972 provided little opportunity for the student to become familiar with the curriculum content of the third technical period at the institutes.

Apprenticeship Board Examination

Table 17 shows the means and standard deviations for the Apprenticeship Board examination for the third technical period.

Table 17

Means and Standard Deviations of Scores Obtained by Apprentices With and Without Vocational Training Prior to Apprenticeship on the Apprenticeship Board Examination for the Third Technical Period

Previous training		Final examination		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	28	73.4	9.3
≥ 100	< 35	12	72.8	7.9
≤ 100	≥ 35			
< 100	< 35	23	72.0	9.4
	No previous training	438	70.8	8.9
Totals		501	71.1	8.9

There were no significant differences between means.

The analysis of the means indicated differences between the groups, but not at the 0.1 level of significance. All the groups containing students with previous training obtained means higher than the mean of the students without such training. The means of these groups with previous vocational education were also above the grand mean.

The standard deviations ranged from a high of 9.3 for the group with the highest level of preparation to a low of 7.9 for the group with insufficient high school credits or vocational credits. The range of 1.4 indicated little difference between extreme scores among any of the groups.

Institute Combined Rating

The data for the institute combined ratings are presented in Table 18. Again there were no significant differences between group means at the 0.1 level, but minor differences were disclosed.

The highest mean of 74.5 was obtained by the group of students with the least amount of previous training. The lowest mean was that for the group of students with no previous training which had a mean of 71.2.

All groups containing students with previous training had means above the grand mean of 71.5. The differences were minor though. The means had a range

Table 18

Means and Standard Deviations of Scores Obtained
 by Apprentices With and Without Vocational
 Training Prior to Apprenticeship on the
 Combined Institute Rating for
 the Third Technical Period

Previous training		Institute rating		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	28	72.1	5.3
≤ 100	< 35	12	72.9	5.8
< 100	≥ 35	23	74.5	6.3
No previous training		438	71.2	6.6
Totals		501	71.5	6.5

There were no significant differences between means.

of but 3.3 and the standard deviations had a range of 1.3, indicating uniformity within and between groups.

Summary. A comparison of means among groups of students with previous vocational education and students without such training was made on two variables for the third technical period. Although no significant differences were found among the group means, minor differences were present. Any significant

differentiation between groups could not be determined, neither in regard to achievement on the Apprenticeship Board examination, nor in regard to achievements based upon the combined institute rating.

COMPARISON OF MEANS IN THE FOURTH TECHNICAL PERIOD

For the previous technical periods only two variables were considered. For the fourth technical period six variables were taken into consideration. The Apprenticeship Board examination, which also is the final determinant in issuing an apprentice his Tradesman's Qualifications Certificate, was the first variable. Other variables were the subject marks of trade theory, shop practice, mathematics, science and business knowledge.

The original group classification, based upon high school credentials, was retained from the first, second and third technical periods.

Apprenticeship Board Examination

The fourth technical period examination conducted by the Apprenticeship Board covers not only new subject material covered in the preceding eight week training course at the institutes, but also material covered throughout the four year apprenticeship program.

Table 19 shows the means and standard deviations of group scores on the examination conducted by the Apprenticeship Board at the conclusion of the fourth technical period.

Table 19

Means and Standard Deviations of Scores Obtained by Apprentices With and Without Vocational Training Prior to Apprenticeship on the Apprenticeship Board Examination for the Fourth Technical Period

Previous training		Final examination		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	28	74.7	7.3
≥ 100	< 35	12	76.3	8.5
≤ 100	≥ 35			
< 100	< 35	23	78.7	5.9
	No previous training	283	75.0	8.0
Totals		346	75.3	7.9

There were no significant differences between means.

Only minor differences existed between means of the individual groups and the grand mean, and there were no differences at the 0.1 level of significance.

The standard deviations ranged from a low of 5.9 for the group with the least previous training to a high of 8.5 for the group with insufficient credits in either high school or vocational courses. The difference indicates a uniform spread of scores within each group.

Trade Theory

The trade theory ratings were based upon a series of tests conducted at the training institute during the fourth technical period. The curriculum for the particular period consists of operating principles for the automatic transmission as well as a review of the trade theory covered in the preceding technical periods. The tests determining the trade theory rating reflects the subject material covered during this final technical period, as well as the three previous periods. Table 20 shows the data for the trade theory marks.

There were no differences between the group means at the 0.1 level of significance. The greatest difference between means was between the group with the most previous training and the group with insufficient credits in one of the two aspects. The former had a mean of 69.6 and the latter had a mean of 73.3.

Table 20

Means and Standard Deviations of Scores Obtained
 by Apprentices With and Without Vocational
 Training Prior to Apprenticeship in
 Trade Theory for the Fourth
 Technical Period

Previous training		Trade theory		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	28	69.6	10.7
≥ 100	< 35	12	73.3	11.2
≤ 100	≥ 35			
< 100	< 35	23	72.8	9.9
	No previous training	283	71.8	10.7
Totals		346	71.8	10.4

There were no significant differences between means.

The only group to obtain a mean lower than the grand mean was the group with the most previous training. The standard deviation range of 1.3 indicated extremely uniform marks through the groups, although the high standard deviations indicated extremes within the groups.

Shop Practice

One half of the total time spent attending the institutes for the technical periods is spent in shop activities. Part of this time is used for gaining work experience on models or school units resembling late model automobiles. A considerable amount of time is also spent in gaining work experience on automobiles belonging to the public. Each student is assigned a mark according to a locally established criterion on a subjective basis.

The data for the shop ratings for the fourth technical period are presented in Table 21. The differences between the groups did not reach the level of significance.

The highest mean of 73.8 was reached by the group with insufficient high school credits, or vocational credits, and the lowest mean of 70.0 was obtained by the group with the most high school credits and most vocational credits. The data presented no evidence to indicate any one group achieving higher than any other group in the practical setting in a shop situation.

Table 21

Means and Standard Deviations of Scores Obtained by Apprentices With and Without Vocational Training Prior to Apprenticeship in Shop Practice for the Fourth Technical Period

Previous training		Shop Practice		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	28	70.0	6.6
≥ 100	< 35	12	73.8	5.2
≤ 100	≥ 35			
< 100	< 35	23	70.4	7.4
No previous training		283	72.1	8.1
Totals		346	71.1	7.8

There were no significant differences between means.

Mathematics

Mathematics is taught in the different technical periods as a separate subject and is referred to as a supporting subject. Throughout the four year program fundamental mathematical concepts are dealt with. In the earlier periods problems related to mechanics are stressed. During the third period the emphasis is on

mathematical problems related to electricity and Ohm's Law. The fourth period is used for reviewing the material from the previous year with new subject material being elementary bookkeeping.

The data presented in Table 22 show the computations for the fourth technical period's mathematics scores. The differences between group means were not significant.

Table 22

Means and Standard Deviations of Scores Obtained by Apprentices With and Without Vocational Training Prior to Apprenticeship in Mathematics for the Fourth Technical Period

Previous training		Mathematics		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	28	78.6	15.6
≥ 100	< 35	12	79.8	11.1
< 100	≥ 35			
< 100	< 35	23	78.8	11.1
	No previous training	283	77.3	15.6
Totals		346	77.6	15.3

The differences between means were not significant.

Science

The data for the science ratings are presented in Table 23. There were no differences between the means at 0.1 level of significance.

Table 23

Means and Standard Deviations of Scores Obtained by Apprentices With and Without Vocational Training Prior to Apprenticeship in Science for the Fourth Technical Period

Previous training		Science		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	28	72.6	19.4
> 100	< 35	12	64.8	20.1
≤ 100	≥ 35	23	72.9	16.4
< 100	< 35	283	69.3	17.7
No previous training				
Totals		346	69.7	17.8

There were no significant differences between means.

Throughout the four year program the apprentice attends science courses. The first and second technical period science courses deal with basic

scientific concepts in physics and chemistry. In the last two periods the emphasis is placed on chemistry as related to lubricating oils and gasoline.

The highest mean of 72.9 was obtained by the students with the least high school credits and vocational credits. The lowest mean was that of the group with insufficient high school credits or insufficient vocational credits.

The range of standard deviation was 3.7 indicating little variance between the groups. The highest standard deviation of 20.1 for the group with insufficient credits in one aspect, indicated a tendency for several extremely high or low marks to exist within the group. The trend was evident among all the groups, however. In evaluating the data it must be kept in mind that the curriculum covers some scientific concepts equivalent to the grade 12 level as well as simpler concepts.

Business Knowledge

The subject of business knowledge covers a wide range. Topics dealt with include matters relating to setting up partnerships, legal aspects of conducting business and other matters relating to the operation of business.

The data from the business knowledge course for the fourth technical period is shown in Table 24.

Table 24

Means and Standard Deviations of Scores Obtained by Apprentices With and Without Vocational Training Prior to Apprenticeship in Business Knowledge for the Fourth Technical Period.

Previous training		Business knowledge		
High school credits	Vocational credits	f	Mean	S.D.
≥ 100	≥ 35	28	74.8	12.9
≥ 100	< 35	12	77.3	9.7
< 100	≥ 35			
< 100	< 35	23	73.5	11.9
	No previous training	283	75.2	12.6
Totals		346	75.1	12.4

There were no significant differences between means.

Differences between means of the individual groups were present, but there were no differences at the 0.1 level of significance.

The highest mean of 77.3 was obtained by the group with insufficient credits in one of the two criteria for advanced standing. The lowest of 73.5 was that of the group with insufficient vocational credits and insufficient high school credits.

There were no indications of the vocational students obtaining significantly higher means than other students in subjects of an academic nature as compared with means in subjects of a vocational or trade nature.

Summary

The achievement levels of students with vocational education prior to commencement of apprenticeship were compared with achievement levels of other apprentices. The comparisons, based upon prior education and training, were made for the four technical periods. The articulation issue was thus not considered. Hence some students with the required number of high school credits, including the required vocational education credits, for full advanced standings, were included in all four periods. Other students with the same qualifications attended only the last three periods, and still others attended only the last two technical periods.

Comparisons were made between group means on two variables for the first, second and third technical periods. One variable was the scores obtained on the examination conducted by the Apprenticeship Board at the conclusion of each period. Another variable was the rating obtained by combining the individual subject marks from the training institutions.

For the fourth technical period six variables were compared. The first variable was the scores obtained on the Apprenticeship Board examination. The other variables were the marks obtained in the individual subjects in the training institutions.

Apprentices with vocational education prior to commencement of apprenticeship were grouped according to the number of high school credits and vocational credits they had presented for articulation purposes. The comparisons were made between these groups and the students without such previous training and with the total populations.

There were no differences between group means at the 0.1 level of significance for the first technical period on the two variables.

For the second technical period there were no significant differences between the means on the institute rating. On the Apprenticeship Board examinations one difference between means was significant. The students with the required number of high school credits, including required number of vocational credits for advanced standings, obtained a mean significantly lower than the mean of students with fewer than the required number of high school credits and fewer than the required number of vocational credits.

There were no significant differences between means in either variable in the third technical period.

For the fourth technical period six variables were used for comparison of means. There were no significant differences. High standard deviations in the academically oriented subjects indicated extremely high and extremely low scores in all groups.

Chapter 6

ANALYSIS OF STUDENT ACHIEVEMENT ON THE APPRENTICESHIP PROGRAM BASED UPON PLACEMENT TEST RESULTS

One problem investigated in this thesis deals with determining the placement criteria for vocational education students advancing to apprenticeship programs.

Previous chapters examined the effect of vocational and high school credits and placement test results in placing the students on accelerated programs with credits for one or two technical periods.

The preceding chapter examined the achievement levels of apprentices with vocational training prior to commencement of apprenticeship with achievement levels of apprentices without such preparation. The study was based upon high school credentials presented to the Apprenticeship Board.

The present chapter presents an analysis of student achievements through the four year program based upon the results of the placement tests. The purpose of this section of the study was to examine if the placement tests were valid instruments for placing former vocational education students on the apprenticeship program, with credits for the first and second technical periods.

The first placement test is identical to the

examination conducted by the Apprenticeship Board at the completion of the first technical period. The term placement test is used, not to differentiate the instrument from the ordinary Apprenticeship Board examination, but rather to identify its use for the specific purpose of establishing a criterion for granting or denying the student an advanced standing.

The variables examined for this part of the study were identical to the ones used in the previous chapter. These variables are also the ones used for determining promotion or non-promotion through the four stages of the apprenticeship program. For the first, second and third technical periods the Apprenticeship Board examination scores and the training center ratings were used. For the fourth and final technical period six variables were used. These variables were the scores obtained in trade theory, shop practice, mathematics, science and business knowledge, as well as the Apprenticeship Board examination for the technical period.

The students were grouped according to the following parameters: the students who had failed the first placement test, those who did not write the first placement test, students without previous vocational education, those who passed the first placement test,

but did not write or failed the second placement test, and the students who passed both the first and the second placement tests. All the students in the subgroups had credits in vocational education except the group referred to as No Previous Vocational Training.

The first technical period variables were examined in respect to students who failed the first placement test or did not write the test. Students who attained pass marks did not enter the program before the second or third technical periods depending upon the attainment of pass marks on the second placement test.

COMPARISON OF MEANS IN THE FIRST TECHNICAL PERIOD

The analysis covered the groups that attended the first technical period at the training centers. The vocational students who failed the first placement test were compared with vocational students who did not write the test and with students without previous vocational training.

Apprenticeship Board Examination

The data for the scores on the Apprenticeship Board examination for the first technical period, shown in Table 25, indicate one significant difference among group means.

Table 25

Means and Standard Deviations of Scores on the
 Apprenticeship Board Examination for the
 First Technical Period Based upon
 Placement Test Results

Group no.	Apprentice classification	f	Mean	S.D.
1	Vocational students who had failed first placement test	14	73.3	6.8
2	Vocational students who did not write first placement test	21	77.3	7.5
3	Apprentices without prior vocational training	506	73.2	8.7
Totals		541	73.3	8.6

The difference between the means of groups 2+3 was significant.

The students with previous vocational training, but who did not write the first placement test, had a mean significantly higher than the mean of apprentices without prior vocational training. The mean of the former group was 77.3 as compared with 73.2 for the latter group.

Institute Combined Rating

The data for the combined institute rating for the first technical period are presented in Table 26.

Table 26

Means and Standard Deviations of Scores on the
 Combined Institute Rating for the
 First Technical Period Based Upon
 Placement Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had failed first placement test	14	66.8	7.8
Vocational students who did not write first placement test	21	71.6	6.8
Apprentices without prior vocational training	506	69.7	8.9
Totals	541	69.7	8.9

There were no significant differences between means.

Again differences were present, but not at the level of significance.

The students who had previously failed the first placement test, and therefore attended the first technical period, attained a mean of 66.8 which was the lowest mean.

Summary. Differences were found between group means on both variables for the first technical period. Only one difference was significant. The students who

did not write the first placement test had a mean significantly higher than the mean of students without prior vocational training on the Apprenticeship Board examination for the first technical period. Other differences did not reach the 0.1 level of significance.

COMPARISON OF MEANS IN THE SECOND TECHNICAL PERIOD

The same groups used for analyzing the data on the first technical period were used for the second technical period with the addition of the group consisting of students who had obtained a pass mark on the first placement test, and had either failed or not written the second placement test. The students in the additional group had entered directly into the second technical period without having attended the first period.

Apprenticeship Board Examination

Table 27 shows the means and standard deviations for the group scores on the Apprenticeship Board examination for the second technical period.

The highest mean of 75.4 was obtained by the group whose members did not write any placement tests. The group which had failed the first placement test had the lowest mean of 70.5 of all groups. The indicated differences between the means of the groups

were not significant.

Table 27

Means and Standard Deviations of Scores on the
Apprenticeship Board Examination for the
Second Technical Period Based Upon
Placement Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had passed first placement test	14	73.9	6.1
Vocational students who had failed first placement test	14	70.5	9.2
Vocational students who did not write first placement test	21	75.4	6.0
Apprentices without prior vocational training	508	72.8	7.7
Totals	557	72.9	7.7

There were no significant differences between
means.

The highest mean of 75.4 was obtained by the
group whose members did not write any placement tests.
The group which had failed the first placement test
had the lowest mean of 70.5 of all groups. The
indicated differences between the means of the groups
were not significant.

Institute Combined Rating

The data for the institute combined rating for the second technical period are shown in Table 28. The differences between means did not reach the 0.1 level of significance.

Table 28

Means and Standard Deviations of Scores on the Combined Institute Rating for the Second Technical Period Based Upon Placement Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had passed first placement test	14	74.7	3.1
Vocational students who had failed first placement test	14	69.7	8.7
Vocational students who did not write first placement test	21	74.7	4.8
Apprentices without prior vocational training	508	72.7	6.8
Totals	557	72.7	6.7

There were no significant differences between means.

The minor differences between means indicated

that the students who had failed the first placement test and attended the first and second technical periods obtained a mean of 69.7 or the lowest mean.

Summary. No significant differences between means were discovered on the Apprenticeship Board examination and on the combined institute rating for the second technical period.

The vocational students who had not written the first placement test obtained the highest means and the vocational students who had failed the placement test obtained the lowest means on both variables. The pattern from the variables on the first technical period continued through the second period.

COMPARISON OF MEANS IN THE THIRD TECHNICAL PERIOD

The analysis considered two variables in the third technical period. The first variable was the scores obtained on the Apprenticeship Board examination and the second variable was the institute combined rating for five subjects.

The group parameters were retained as for the previous technical period and a new group was added. The group of students who had obtained a pass mark on both the first and second placement tests was included. These students had met the criteria for maximum

credits for advanced standings on the apprenticeship program, and had now attended one of the technical institutes for the first time.

Apprenticeship Board Examination

The means and standard deviations for the Apprenticeship Board examination for the third technical period are shown in Table 29. The students who had passed both placement tests and those who had passed only the first placement test had means of 75.8 and 77.1 respectively. These means were somewhat higher than the mean of the group containing students who had failed the first placement test. The latter group had the lowest mean.

The standard deviation of 10.5 for the students who did not write any placement tests was somewhat higher than the other standard deviations. Extremely high and low scores were thus more predominant in that group than in any other group.

Table 29

Means and Standard Deviations of Scores on the
 Apprenticeship Board Examination for the
 Third Technical Period Based Upon
 Placement Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had passed both placement tests	13	75.8	8.1
Vocational students who had passed the first placement test	14	77.1	6.8
Vocational students who had failed the first placement test	14	69.1	6.9
Vocational students who did not write the first placement test	21	70.1	10.5
Apprentices without prior vocational training	439	70.8	8.9
Totals	501	71.1	8.9

The differences between means were not significant.

Institute Combined Rating

There were no significant differences among group means on the institute combined rating for the third technical period. The data are shown in Table 30.

Table 30

Means and Standard Deviations of Scores on the
 Combined Institute Rating for the Third
 Technical Period Based Upon
 Placement Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had passed both placement tests	13	75.2	6.9
Vocational students who had passed the first placement test	14	75.0	4.1
Vocational students who had failed the first placement test	14	70.6	4.8
Vocational students who did not write the first placement test	21	72.4	6.2
Apprentices without prior vocational training	439	71.2	6.5
Totals	501	71.5	6.5

The differences between means were not
 significant.

Summary. Although no significant differences
 between group means were discovered for the third
 technical period, minor differences were present.
 Students having passed one or both placement tests
 had the highest means of all groups, and students

who had failed the placement test had the lowest mean.

COMPARISON OF MEANS IN THE FOURTH TECHNICAL PERIOD

Six variables were examined in the fourth technical period. The first variable was the Apprenticeship Board examination. A pass mark of 65 on this examination, and the completion of the required work experience time, entitles the apprentice to be issued a journeyman's license, referred to as a Certificate of Proficiency as a Motor Mechanic. The latter term is the official term used by the issuing authority. A pass mark of 70 entitles the holder of the certificate to a special notation, a "red seal", licensing him to operate in any province in Canada with the exception of Quebec.

The five variables were the scores obtained at the institutes in trade theory, shop or laboratory, mathematics, science and mathematics.

The group classification used in the analysis of the means for the third technical period was retained for the fourth and last technical period. Since an apprentice cannot enter the apprenticeship program at a later stage than the third technical period the subgroups for these last two periods were identical. As the population changed a change also

took place in the size of the group of apprentices with no previous vocational training.

Apprenticeship Board Examination

Table 31 shows the means and standard deviations of scores on the Apprenticeship Board examination for the fourth technical period. The differences among the group means were not significant.

Minor differences between group means indicated that students who had passed the first placement test only had the highest mean of all groups. These students did not write the second placement test in spite of attaining pass marks on the first placement test.

The lowest mean was attained by students who had failed the first placement test. Their mean was thus lower than the mean of apprentices without prior vocational education.

Table 31

Means and Standard Deviations of Scores on the
 Apprenticeship Board Examination for the
 Fourth Technical Period Based Upon
 Placement Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had passed both placement tests	13	76.5	8.0
Vocational students who had passed the first placement test	14	78.5	5.4
Vocational students who had failed the first placement test	14	71.8	9.2
Vocational students who did not write the first placement test	21	78.2	7.0
Apprentices without prior vocational training	284	75.0	8.0
Totals	346	75.3	7.9

The differences between means were not
 significant.

Trade Theory

Whereas only minor differences between means
 were discovered on the Apprenticeship Board examination
 a significant difference was found on the trade theory
 scores as shown in Table 32.

Table 32

 Means and Standard Deviations of Scores
 in Trade Theory for the Fourth
 Technical Period Based Upon
 Placement Test Results

Group no.	Apprentice classification	f	Mean	S.D.
1	Vocational students who had passed both placement tests	13	74.8	6.3
2	Vocational students who had passed the first placement test	14	76.4	7.7
3	Vocational students who had failed the first placement test	14	65.2	9.0
4	Vocational students who did not write the first placement test	21	70.2	10.3
5	Apprentices without prior vocational training	284	71.9	10.6
Totals		346	71.8	10.4

The difference between means of groups 2+3 was significant.

Students who had failed the first placement test had a mean significantly lower than the mean of the students who had passed the placement test. The former had the lowest mean of all groups and thus had a mean

lower than students without prior vocational training and lower than the students who did not write any placement tests.

The relatively high standard deviations for the students who did not write the placement tests and the apprentices without prior training indicated extreme high and low scores within both groups.

Shop Practice

The data for shop practice marks in the fourth technical period are presented in Table 33. There were no significant differences between group means. The differences were indeed minor with the means having a range of 4.4.

Students with prior vocational training who had failed the first placement test had the lowest mean of all groups, and students who had passed the first placement test only had the highest mean.

Table 33

Means and Standard Deviations of Scores
 in Shop Practice for the Fourth
 Technical Period Based Upon
 Placement Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had passed both placement tests	13	71.4	5.3
Vocational students who had passed the first placement test	14	72.1	4.5
Vocational students who had failed the first placement test	14	67.9	8.3
Vocational students who did not write first placement test	21	71.5	7.5
Apprentices without prior vocational training	284	72.1	8.1
Totals	346	71.9	7.8

The differences between means were not significant.

Mathematics

The data for the marks in mathematics at the institutes shown in Table 34 did not indicate any differences between means reaching the level of significance.

Table 34

Means and Standard Deviations of Scores
 in Mathematics for the Fourth
 Technical Period Based Upon
 Placement Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had passed both placement tests	13	82.6	9.0
Vocational students who had passed the first placement test	14	80.4	16.9
Vocational students who had failed the first placement test	14	76.7	13.9
Vocational students who did not write the first placement test	21	77.9	11.4
Apprentices without prior vocational training	284	77.2	15.6
Totals	346	77.6	15.1

The differences between means were not significant.

The group which had passed both placement tests and entered the apprenticeship program in the third technical period had the highest mean of 82.6. The group which had passed the first placement test only, obtained a mean of 80.4. This group had entered the

program at the second technical period.

The lowest mean was obtained by the students who had failed the first placement test.

Science

The science rating data for the fourth technical period at the institutes are shown in Table 35. There were no differences reaching the 0.1 level of significance.

The highest mean of 74.9 was obtained by the group of students who did not write any placement tests.

The lowest mean of 62.3 was obtained by the students who had failed the first placement test and thus had attended all four technical periods.

Table 35

Means and Standard Deviations of Scores
 in Science for the Fourth Technical
 Period Based Upon Placement
 Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had passed both placement tests	13	69.9	20.0
Vocational students who had passed the first placement test	14	74.4	19.2
Vocational students who had failed the first placement test	14	62.3	21.5
Vocational students who did not write the first placement test	21	74.9	13.0
Apprentices without prior vocational training	284	69.4	17.7
Totals	346	69.7	17.8

The differences between means were not significant.

Business Knowledge

Although differences between group means were indicated in the subject of business knowledge the differences were not at the level of significance. The data are presented in Table 36.

Table 36

Means and Standard Deviations of Scores
 in Business Knowledge for the Fourth
 Technical Period Based Upon
 Placement Test Results

Apprentice classification	f	Mean	S.D.
Vocational students who had passed both placement tests	13	78.9	10.1
Vocational students who had passed the first placement test	14	81.9	8.7
Vocational students who had failed the first placement test	14	70.1	13.1
Vocational students who did not write the first placement test	21	70.9	11.7
Apprentices without prior vocational training	284	75.2	12.5
Totals	346	75.1	12.4

The differences between the group means were not significant.

The students who had failed the first placement test obtained a mean of 70.1 which was not only the lowest mean but also considerably lower than the mean of 81.9 obtained by the group of students who had passed the placement test.

The standard deviations ranged from a low of 8.7 to a high of 13.1 thus showing not only great variety within groups but also between groups of extreme high and extreme low scores.

Summary

An analysis has been presented of achievement levels of apprentices with vocational education prior to commencement of apprenticeship compared with achievement levels of apprentices without such preparation. The comparisons were based upon student classification according to placement tests conducted by the Apprenticeship Board. The tests are instruments used to determine placement of students on apprenticeship programs, and are identical to the examinations conducted at the conclusion of the first and second technical periods respectively.

The populations for this section of the project were all apprentices who had attended the institutes in the respective technical periods. The subgroups contained students with various amounts of high school credits and vocational credits classified according to the placement test results. One subgroup contained students who for various reasons had not written any placement tests, although they had attended vocational courses.

Comparison of achievement levels were made from the first technical period through the fourth and final period. Students who had failed the first placement test were considered from the first technical period while those students who had passed one or both placement tests were taken into consideration as they entered the program in the second or third technical periods respectively.

For the first, second and third technical periods two variables were considered. The first variable was the Apprenticeship Board examinations for the respective periods, and the second variable was the combined institute rating. For the fourth technical period the combined institute rating was replaced by the five individual subject marks.

Apprenticeship Board Examinations. The analysis did not disclose any significant differences between group means on the Apprenticeship Board examinations for the second, third and fourth technical periods.

A significant difference between means was discovered for the first technical period. Students without vocational training prior to apprenticeship had a mean significantly lower than the mean of students who had attended vocational courses, but for undetermined reasons did not write any placement tests.

The latter group of students had the highest means of all groups for the first and second technical periods. For the third period it had a mean nearly equal to the grand mean and for the fourth period a mean slightly below the highest mean.

Students who had passed the first placement test, and thus entered the program in the second period, obtained means well above the grand means for all periods. For the third and fourth periods they had the highest means of all groups.

The group whose members had passed both placement tests, and thus entered the program in the third period, also obtained means above the grand means for the two technical periods they attended the technical institutes.

Students who had failed the placement test had low means throughout the four year program.

Institute Combined Ratings. There were no significant differences between means on the three institute combined ratings. The pattern from the Apprenticeship Board examinations was similar to that of the institute combined ratings. Students who had failed the first placement test generally had the lowest means and students who had passed one or both placement tests had high means.

Subject Marks for the Fourth Period. A difference between means in trade theory for the fourth period was significant. Students who had failed the first placement test had a mean significantly lower than the mean of students who had passed the test.

The differences between means in shop practice, mathematics, science and business knowledge were all minor. The lowest means were generally obtained by the students who had failed the first placement test.

Chapter 7

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

In this chapter a summary of the preceding chapters is presented with a restatement of the purpose and significance of the project. The major findings and conclusions resulting from the findings are presented on a chapter basis. Some implications are also reported as are recommendations for further study.

SUMMARY

The first section of the chapter reviews the presentations in the preceding chapters including the research problem and research design.

The Research Problem and Research Design

The Commission on Educational Planning (Worth:1972) reported that agreement between the Department of Education and the Alberta Apprenticeship Board has never been too satisfactory. One particular problem referred to was a reluctance of the Apprenticeship Board to accept vocational high school programs for more than nominal credit.

Two general problems were formulated. One problem was to determine criteria governing the placement of vocational high school students on

apprenticeship programs. Subproblems were to determine the effect of high school credits, vocational credits and placement tests in placing vocational students on apprenticeship programs with credits for one or two technical periods, and reductions in time to be served in industry to complete apprenticeship.

Another problem was to compare achievement levels through the four year training program of apprentices with previous vocational training with achievement levels of apprentices without such training.

Comparisons were made with the vocational students grouped according to the number of high school credits and vocational credits presented for articulation purposes regardless of actual placement on apprenticeship programs. Comparisons were also made with the apprentices grouped according to placement test results regardless of actual high school and vocational credits.

Achievement levels were compared on the basis of Apprenticeship Board final examinations conducted at the conclusion of each training period.

Achievement levels were also compared based upon the combined institute rating, constituting five separate subjects for the first, second and third technical periods. For the fourth period the respective subject marks from the technical institutes were

compared.

Scheffe's (1964:68) method for multiple comparisons of observed means was used with 0.1 arbitrarily set as the level of significant difference between means.

Chi-square tests with Yates correction were used to test for independence of variables in determining criteria for placement on apprenticeship programs.

The population selected for the study consisted of all motor mechanics who had attended the fourth technical period at the Northern and Southern Alberta Institutes of Technology over a one year period. From the population the apprentices who attended vocational high school courses as part of their general education were identified. Data in regard to high school credits, vocational credits and possible placement test data were obtained from the Alberta Apprenticeship Board. Data were also obtained in regard to specific classes attended for the three previous technical periods and complete class records for these periods were included in the study.

An extensive search of the literature was made. Although the value of educational research was stressed and an emphasis placed on follow-up studies, few references were discovered in regard to vocational

education students articulating with apprenticeship programs. As a result of the discovery a need was seen for a pilot study.

CHAPTER FINDINGS AND CONCLUSIONS

Chapters 4, 5 and 6 report the data obtained and the findings resulting from the computations of the data. Major findings and conclusions from each of the chapters are presented in this section.

Major Findings: Chapter 4

One purpose of the study was to determine criteria for placement of vocational students on apprenticeship programs with credit for one or two technical periods and granting of time reductions to be served in industry to complete apprenticeship.

It was found that 63 (18.2%) of the population of 346 apprentices in the fourth and final technical period had attended vocational high school courses prior to entering apprenticeship. Only 28 (44.4%) of these students had presented the required number of high school and vocational credits required for placement on apprenticeship programs with full advanced standings.

Nearly all, 26 (92.9%) of the eligible students wrote the first placement test and 18 (69.2%) obtained

pass marks of 65 or higher. These students were all granted credit for the first technical period.

The second placement test, corresponding to the final Apprenticeship Board examination for the second technical period, was written by 11 (61.1%) of the 18 students who had passed the first placement test. All but one student obtained pass marks and were granted credit for the second technical period.

The accreditation policy states that students presenting fewer than the stipulated high school and vocational credits may expect to be considered for lesser apprenticeship credit on the basis of individual performance upon undertaking apprenticeship.

It was found that the stipulated high school and vocational credits resulted in the students writing the first placement test. Such condition could, however, not be identified for students presenting fewer than the required credits. Computations indicated in regard to these students, that high school and vocational credits were independent variables in respect to writing the placement test.

Some students with less than the required high school credentials who had passed the first placement test also wrote the second placement test and some did not write the test. It was found that writing the first test and obtaining a pass mark was an independent

variable of being granted permission to write the second placement test.

Students with less than the required number of high school and vocational credits had a combined pass rate slightly higher than students with the required credits. Using several different parameters for grouping indicated, however, that high school and vocational credits were independent variables of pass and fail marks obtained.

The vocational high school students were grouped according to high school credentials, and the means on the first placement test were compared. There were no significant differences between means. The grand mean was lower than the established pass mark. Students with the most high school and vocational credits obtained a mean slightly higher than the pass mark.

The grand mean for the second placement test was somewhat higher than the grand mean of the first test. When the students were grouped with those with full credit in one group and those with insufficient credit in another, it was found that the latter had a mean significantly higher than the former.

All students who obtained pass marks on the first placement test were granted credit for the first technical period.

Likewise students who obtained pass marks on the second placement test were granted credit for the second technical period.

Obtaining pass marks on one or both placement tests also resulted in the reduction of time to be served in industry to complete apprenticeship with the maximum reduction allowable of three months per year for the four year program.

Some students who failed the first placement test were also granted the maximum reduction in time. Others who did not write the test were granted a reduction amounting to 1-1/2 months per year. Any specific criteria for granting of time credits could not be established apart from the observation that writing the placement test was associated with the granting of time credits.

Time reductions were compared with high school credentials. Presenting the required high school and vocational credits for articulation generally resulted in maximum time reduction. Criteria for granting time reductions could not be established for students presenting less than the required high school and vocational credits.

Conclusions: Chapter 4

The findings in the Chapter indicated that the accreditation policy as stated was followed with

several exceptions. The students who had presented the required credits for advanced standings did write the first placement test. However, not all students who had obtained pass marks on the first placement test advanced to write the second placement test.

Obtaining pass marks on the first placement test resulted in the granting of credit for the first technical period. Credit for the second technical period was granted for obtaining pass marks on the second placement test.

Criteria for permitting students with fewer than the stipulated high school and vocational credits to write placement tests were, if present, based upon factors other than high school credentials.

A majority of former vocational students completing apprenticeship had not completed the vocational programs pursued while attending high school.

Vocational students generally have low scores on the first placement test with a high failure rate.

Having taken part of, or completed a vocational program in high school was not related to obtainment of fail or pass marks on the first placement test.

Major Findings: Chapter 5

Chapter 5 reports on comparisons of achievement

levels of apprentices with vocational training prior to commencement of apprenticeship and achievement levels of apprentices without such training through the four year program. The actual placement of vocational students, based upon placement test results, was disregarded for this part of the study.

The comparisons were made on two variables for the first, second and third technical periods. One variable was the scores obtained on the Apprenticeship Board examinations conducted at the conclusion of each technical period. Another variable was the institute combined rating reported to the Apprenticeship Board after completion of each period. For the fourth technical period the institute combined rating was replaced with the individual subject scores in five subjects.

The apprentices were grouped into four groups for comparison of means. One group contained students having presented the required high school credentials for full advanced standings. One group contained students with fewer than the required credits in either high school or in vocational credits. The third group contained students with some credits in vocational courses but insufficient high school as well as vocational courses for full accreditation. The fourth group contained apprentices without prior vocational

training.

There were no significant differences between group means on either variable throughout the four year program except in one case. On the Apprenticeship Board examination for the second technical period, students with the required high school and vocational credits for full advanced standings had a mean significantly lower than the mean of students who had presented insufficient high school and insufficient vocational credits. The former group of vocational students had a mean lower than all groups containing students with a vocational background and lower than the mean of apprentices without prior vocational training.

Students with the most high school and vocational credits generally had lower, or the lowest means throughout the four year program, while students with insufficient credits generally had the highest means on both variables.

The vocational students did not have means significantly different from means of other apprentices in the individual subject marks of mathematics, science and business knowledge in the fourth technical period.

Conclusions: Chapter 5

The findings led to the conclusion that vocational students placed on apprenticeship programs

achieved slightly below the levels of apprentices without vocational training prior to commencement of apprenticeship.

Although the group parameters were based upon high school and vocational credits it must be realized that students who had passed one or both placement tests were not considered for the first, and first and second technical periods respectively. Students with the required high school credentials had the lowest means on both variables for the first technical period as well as for the second technical period. It thus follows that the placement tests conducted by the Apprenticeship Board had been excellent instruments for predicting success on apprenticeship programs.

The same findings also led to the conclusion that high school credits and vocational credits were poor predictors of future success on apprenticeship programs. While some former vocational students attained high marks after they had entered the apprenticeship program in the second or third periods, other vocational students with the same credentials attained very low marks in spite of having attended all four technical periods.

Major Findings: Chapter 6

The chapter presents a comparison of achievement levels similar to the one presented in

Chapter 5. The groups, which achievement levels were compared, were based upon placement test results. One group contained students who had passed both placement tests. Another contained students who had passed only the first test. Students who had attempted the first test, but failed, were in a third group. These groups were then compared with students who had not written any placement tests, and students without prior vocational training.

As actual placement on apprenticeship programs was influenced by placement test results, as shown in Chapter 4, some group mean comparisons were only made for the third and fourth periods. Students who had passed the first placement test only entered the apprenticeship program in the second technical period, while students who had passed both placement tests entered the program in the third technical period.

There were no significant differences between group means for the second and third technical periods on either variables. A significant difference between group means was discovered for the first technical period. Students who did not write any placement tests had a mean significantly higher than the mean of students without prior vocational training on the Apprenticeship Board examination.

A significant difference between group means

was also found in trade theory marks in the fourth technical period. Students who had passed the first placement test only, had a mean significantly higher than the mean of students who had failed the placement test.

Students who had passed one or both placement tests generally had high means for the periods attended while students who had failed the first placement test generally had low means on all variables. Indeed the latter group had the lowest means of all groups except on the Apprenticeship Board examination for the first technical period.

Conclusions: Chapter 6

The findings led to the conclusion that former vocational students who had been able to attain pass marks on the placement tests conducted by the Apprenticeship Board were well qualified to enter apprenticeship programs with credits for one or two technical periods.

Students who had not been able to attain pass marks on the placement tests had very low means throughout the four year program. Although the means were low only one example was discovered where this group of students had a mean significantly lower than the mean of another group.

The conclusions from Chapter 5, that the

placement tests were good predictors, and high school credentials were poor predictors, for success on apprenticeship programs were reinforced.

The generally high means attained by students with some vocational training prior to apprenticeship on the variables for the first and second technical periods indicate that the placement tests had not been utilized to their fullest extent by the Apprenticeship Board.

General Conclusions

The findings in this thesis supported the claim that some vocational students had indeed been granted but minimal credits for their vocational courses when advancing to apprenticeship programs.

An examination of achievement levels revealed, however, that the granting of minimal credits was not without cause. Some vocational students, regardless of numbers of high school and vocational credits, were indeed low achievers on apprenticeship programs.

The findings also revealed that the Apprenticeship Board had not applied the stated placement policy with consistency.

A lack of regulations governing placement of vocational students who have less than the stipulated high school and vocational credits was obvious.

IMPLICATIONS

The study revealed several implications in regard to the research design and in regard to the findings and conclusions.

Research Design and Procedures

Although the study examined but one specific trade, conclusions were drawn that could have major ramifications. Similar studies could examine other trade areas to confirm or refute the present findings which may not necessarily reflect the accreditation policies and achievement levels of vocational students advancing to apprenticeship in trades other than motor mechanics.

The investigation served the function it was intended to serve. Considering the relatively low number of vocational students being granted full advanced standings and maximum reductions in time to be served among the students who eventually succeeded in becoming journeymen, the question arises as to how many vocational students dropped out of the program before completion. Another question is how many vocational students decided against entering apprenticeship after having failed the first placement test or as a result of not knowing before commencement of apprenticeship how many periods of credit they would

be granted and how much time reduction they could expect.

Answers to these questions can readily be had through a short time span study of applicants for apprenticeship. Meaningful studies of achievements can also be conducted by selecting populations in the individual technical periods currently attending the technical institutes. The largest problem in such research will be the low number of apprentices having received vocational training prior to apprenticeship.

Accreditation Policy

The revelation of high failure rates on the placement tests raises questions in regard to what constitutes success for the vocational programs offered in the high school system. If apprenticeship accreditation is a criterion of success for the vocational program, then in respect to the results of this study, the criterion is not being met.

If the curricula are somewhat similar, as claimed by Harder (1972:17), for the junior periods of apprenticeship and vocational courses, a far greater pass rate should be possible. To accept anything else would indicate a waste of both human and financial resources. The taxpayer is already complaining

about the high cost of education and is not prepared to accept what may to him look like a waste of financial resources.

Of much greater importance is the disappointment a student must feel when he learns that he must attend classes in which subject material is being taught of a similar nature to, and at a level equal to what he was exposed to in vocational high school courses. He may indeed doubt the value of his high school education and ask: "Why bother with high school education and why bother with vocational education if the credits you earn are not recognized after you leave school?"

For a student in such a situation a financial set back is also a reality. By not being granted the credits and granted the advanced standing expected, the apprenticeship is prolonged and promotion from one technical period to another is delayed. The apprentice is paid a salary as a percentage of the salary paid the journeyman with progressive increases as he moves from one technical period to the next.

Achievement Levels

The achievement level comparisons indicated a wide latitude among apprentices with previous vocational training on the Apprenticeship Board examinations and on the institute combined ratings. While some students obtained high marks others

obtained very low marks in spite of the same high school credentials. Questions thus arise in regard to the evaluation procedures used in the vocational high schools and the possibility of inconsistencies in issuing vocational credits.

Other questions may be raised in regard to the curriculum content of the vocational courses and the degree to which course outlines and guides are followed. Are the vocational programs concentrating on the subject material covered during the first and second technical periods of the apprenticeship program? If the answer to the question is not affirmative, the candidate for apprenticeship has been misled.

The concept of apprenticeship training may be in need of some major revisions. The apprenticeship system as it exists in Alberta may indeed be in need of major revisions. At this moment in time, however, any person who has aspirations of becoming a journeyman must necessarily be successful as an apprentice. If vocational training is to be provided in the high schools and such training is to replace parts of the lock-step program of apprenticeship the two programs must necessarily be closely coordinated for ultimate success.

RECOMMENDATIONS

Recommendations resulting from the findings, conclusions and implications are presented in point form.

1. This investigation examined placements and achievement levels in only one trade area. It is therefore recommended that further research be conducted to determine if the research design and procedures used in this project are applicable to other trades and vocational programs.

2. The placement study was based upon data originating three to four years before the students completed apprenticeship. It is suggested that a similar study be carried out to determine the nature of the placement process and criteria for placement with advanced standings on accelerated programs at this moment in time.

3. The study did not investigate the number of students who left apprenticeship programs before completion, nor the reasons for students leaving the programs. Hence it is recommended that such a project be undertaken. The study could also examine if a problem exists in students deciding against entering apprenticeship due to uncertainties in being granted credits by the Apprenticeship Board.

4. It was found that some vocational students

were having difficulties in obtaining pass marks on the placement tests in spite of having attended vocational programs as part of their general education. These same students were also having difficulties in obtaining satisfactory marks throughout the apprenticeship programs. It is therefore recommended that an extensive research program be instigated to determine the reasons for such difficulties. Areas to be researched are curriculum, evaluation procedures and vocational guidance procedures in Alberta high schools.

5. A prime area for further research is in the coordination of the two training programs that in some aspects have the same ultimate goals of assisting the student to learn to cope with his environment.

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